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Mahaweli Economic Agency
Mahaweli Engineering and Construction Agency

MARD PROJECT



Pimburattewa
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**RIPARIAN
FORESTRY WORK
IN SYSTEM B**

by

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**MARD PROJECT
PIMBURATTEWA**

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CONTENTS

1.	Introduction	1
2.	General features of riparian forests in irrigation projects	1
2.1	Environmental aspects	1
2.2	Socio-economic aspects	2
2.3	Legal aspects	3
2.4	Physical aspects	3
3.	Objectives of drainage improvement in irrigation development	3
4.	General features of engineering designs in drainage improvement	4
5.	Special features incorporated into the design of drainage improvement in System B	4
6.	Kudaoya riparian forestry project in Zone 5 of system B	5
6.1	Project area	6
6.2	Project objectives and concept	6
6.3	Project concerns	7
6.4	Project implementation plan	7
7.	Forestry work undertaken in Zone 1	8
8.	Problems encountered and remedial actions taken	8
9.	Interim evaluation on Kudaoya forestry project	9
10.	Progress of riparian forestry program	9
11.	Recommendation for future expansion	10
11.1	Specific Recommendations	11
11.2	General recommendation	11
11.3	Recommendations for areas not yet developed for irrigation	12
12.	Conclusion	13
	References	14

ANNEXURE

- Annexure 1 Minutes of the first meeting with farmers in the Kuda Oya area
- Annexure 2 Terms of reference prepared for seeking offers from Sri Lankan universities
- Annexure 3 Report on the interim evaluation
- Annexure 4 Tables

1. Introduction

Drainage improvement in Zone 1 & 5 of System B is one of the main component of the MARD project. Environmental Impact Assessments of the MARD project specifically recommended the measures to be taken in preservation of riparian forests and associated wetlands during the improvement process. Under drainage improvement works, natural streams of the area were improved in addition to the on-farm drainage. In these improvements works enhancing the natural environment associated with riverain landscape were also taken into consideration in addition to pure hydraulic engineering aspects.

Improvement works related to enhancement of natural environment included,

1. Preservation of riparian forest during construction phase in river improvement works,
2. Preservation of the wetlands associated with riverain eco-system,
3. Improvement of deteriorated riverain eco-system by replanting trees along river banks,
4. Involvement of the settler farmers in the environment preservation work.

The above environmental improvement works were conceived to enhance the natural bio-diversity in the agriculture landscape by restoring native, dry zone forest vegetation and wetlands in the reservation allocated for natural streams.

This report describes the work carried out by MARD in riparian forestry work in System B. Recommendations are also given for the expansion of the work beyond MARD.

2. General features of riparian forests in irrigation projects

2.1 Environmental aspects

In agriculture landscapes like System B, natural riverain environment is under constant threat because of development activities adjacent to river banks. Riparian lands form the aquatic terrestrial interface of the ecological cycle. They are also referred as "buffer zones". The preservation of riverain forests and associated wetlands with their high degree of bio-diversity play very vital role in maintaining the equilibrium of the natural environment of the area. Therefore authorities who manage irrigation systems should pay special attention to prevent activities which damage riverain environment.

Riverain trees enhance the aesthetic value of the landscape in addition to their contributions to the forestry cover. Riverain forests and associated wetlands enhance wildlife habitat and improve the quality of life for local residents by providing accessible natural areas. It also provides useful plant species such as those used in indigenous medicines and for animal consumption.

In recent years there has been a growing realization that flora and fauna of wetlands associated with rivers are valuable components of the landscape. Wetlands act as filters by removing pollutants from waters flows through them. They are like kidneys of the landscape.

Also riverain forests act as natural corridors connecting the core habitats of wild life. Most of the natural streams in System B flows in to natural wetlands called villus which are very rich in wildlife habitat. Properly preserved riverain forests belts act as pathways for fauna to access to feeding grounds from these villus. Some of these villus in System B are internationally well known for their ecological importance. For example the entire flood floodplain bordering System B consisting of 38 villus, is listed as site number 13 in the Directory of Asian Wetlands.

2.2 Socio-economic aspects

Agriculture activities adjacent to river banks always have a negative effect on the riverain environment unless the activities are controlled and properly managed. Illegal encroachment in to the reservations of natural streams are difficult to control because regular monitoring is difficult due to difficulty in access. Farmers always have tendency to encroach reservations allocated for natural streams. Wetlands are usually treated by farmers as wastelands and they are either drained or fillit for other uses.

One way of motivating farmers to preserve riverain forests is through awareness programs coupled with community participated forestry work. Participation of the farming community is very vital in any development work undertaken in an irrigated agriculture projects. Forestry development work is not an exception. Farmers especially those who do the farming adjacent stream banks have to be involved in such activities. Sustainability of the project largely depends on the extent of their involvement. Care has also to be taken to ensure that local residents see the forest as theirs and that they will protect and maintain it after the project period.

Although it is not the primary objective of a riverain forestry program to develop production forests, utility plant species such as those used in indigenous medicines or for human and animal consumption and fruit trees can also be grown along with forest trees. The growing of utility trees in the land strips bordering farms can be encouraged as an economic incentive for the farmers who participate in the forestry work.

2.3 Legal aspects

The Crown Land Ordinance and its regulations stipulate the protection of stream reservations. For any stream up to a width of 5M, 20M width of land should be preserved on either side. For streams up to a width of 15 M, the riparian reservations goes up to 40M. For streams over 15M, a belt of 60M is stipulated.

With increasing pressure of population particularly on agriculture land, it had become increasingly difficult to maintain stream reservations intact. A water shed management survey by the Water Resource Board in Sri Lanka in the 1960s revealed that over 80% of the stream reservations were encroached and illicitly occupied in some areas of the hill country. Similar tendency can be observed in Irrigation schemes in the dry zone in Sri Lanka. The rich soils and accessibility to water, naturally attracts many farmers to such locations in the valleys. It is also noted that little attention has been given at the design stage of irrigation systems in allocating proper land areas for reservations.

2.4 Physical aspects

Riverain trees stabilize stream banks. Root systems of trees in stream banks act as natural lining regulating the erosion. In irrigation project like system B where the soils are structurally weak, this type of stabilization is very important. (Figures 1 & 2 of Annexure 4). Riverain forest also regulates sediment transport, water quality and runoff to streams and reservoirs.

Unlike irrigation canals, natural streams are not regularly maintained against siltation. Natural riverain trees which prevent the eroded soil getting into the streams are therefore very useful in such situations. Unfortunately in Mahaweli irrigation system designs, no provision such as maintenance roads in irrigation canals have been provided for drainage maintenance. Stream vegetation which provide a self maintenance system reducing regular maintenance needs is an asset under such circumstances. Reduction of maintenance needs reduce the O & M cost of drains.

It has been claimed with convincing evidence that the destruction of riparian vegetation belts had resulted in increasing the land slide hazard in hill country and increasing siltation of streams and reservoirs. Therefore riparian vegetation also helps to increase the useful life time of reservoirs .

3. Objective of drainage improvement in irrigation development

Main objective of the drainage improvement in an irrigation system is to meet both drainage and flood prevention requirements.

In irrigation systems, draining out of excess water from irrigated agriculture fields is a very vital function in the operation of the system. Poor drainage conditions cause water logging and salinity built up in agriculture lands resulting crop damages and environmental hazards. Long term sustainability of an irrigated agriculture system largely depends on how efficiently the drainage system functions.

Natural streams within an irrigation system play a very important role in draining out excess water. They act as main outlets for secondary and tertiary drains which are built on farms. Unless these outlet facilities do not function properly, the on-farm drains constructed above them can not release water.

With the introduction of irrigation system, natural hydrological balance of the area is changed. Area becomes more prone to flood during heavy rains in Maha season damaging farm lands adjacent to rivers. Therefore the natural streams should also be able to cope with floods which can damage the farms adjacent to the stream banks.

4. General features of engineering designs in drainage improvements

At the development stage of an irrigation systems, natural streams are usually improved to function as outlets for on-farm drains as well as to cope with floods during heavy rains.

These improvements include;

1. Removing silt and debris from the stream beds along with the widening and deepening of the stream section.
2. Cleaning the stream path by removing fallen trees across the stream bed
3. Straightening of meandering stream paths
4. Removing man made obstacles like anicuts which are no longer required because of the newly introduced irrigation facilities.
5. Building of dikes at over flowing section of the stream banks.

5. Special features incorporated in to the design of drainage improvements in System B

In addition to pure hydraulic engineering aspects, both environmental and social factors were also taken in to consideration at the design stage of drainage improvement works funded under the MARD project.

From hydraulic engineering view point, the main criteria of the design would be to carry water from a point A to a point B as fast as possible without causing erosion and over flowing. This can be done by deepening, widening and straightening the stream paths. But from environmental view point, the design should be such that the disturbance to the natural eco-system of the riparian lands should be minimum. Therefore the need to preserve the stream side vegetation will limit the degree of physical improvement activities.

To check the erosion of streams, slopes of the canal beds have to be controlled. In irrigation supply canals, the slopes of stream beds are controlled by introducing concrete structures called drops. In natural drainage however, drops are not normally used because of their high cost. Some time rubble are packed, either as a lining or in the form gabions. These are also very costly improvements usually used only in urban areas. In agriculture lands, trees can very effectively be used to stabilize river banks.

In order to meet both hydraulic and environmental criteria following steps were followed in drainage improvement works implemented under the MARD program.

1. Widening of the cross section of the streams were limited to the minimum. Main concern was to remove the obstruction like fallen trees, sand bars, bushes, debris and man made anicuts with minimum disturbance to the riverain vegetation.
2. Straightening of meandering paths of natural streams were reduced to minimum. Only when the river bends are very acute, straightening was recommended.
3. Steps were taken to preserve the trees remained in the banks intact during the construction in addition to planting forest trees in already deforested stream reservations.
4. Care was taken at the land development stages to allocate proper reservations in newly constructed areas like Block 503. When stream flows through natural wetland areas enough reservations were allocated to preserve them.

6. Kuda Oya Riparian Forestry Project in System B

Kuda Oya, the main natural stream of Zone 5 was selected as a pilot area to do reforestation work along with drainage improvement program under MARD.

The objective of the pilot project was to reforest approximately 16 Kms of riparian lands on either side of Kuda Oya immediately downstream from the Pimburattawa tank. The project was planned as a community forest project.

A team of experts comprising of social scientists, forest specialists, education specialists and engineers, prepared a project proposal in consultation with the farmers. Team members had series of meeting with farmers and a forestry plan and an implementation strategy were formulated. Project was commenced on June 1993. Minutes of meetings had with farmers at the very inception of the project are attached in the annexure 1.

6.1 Project Area

The Kuda Oya is a left bank tributary of the Maduru Oya (Figure 1 & 2 in Annexure 2). With the construction of the Pimburattawa reservoir in the 1950s, the Kuda Oya is dammed in its upper reaches. The present channel of the Kuda Oya beginning from Pimburattawa dam site collects water from the spillway and drainage waters from paddy fields on its either side. The terrain of Kuda Oya stream basin and surrounding area is low-lying with marshy conditions. The stream tend to braid and meander and change their courses periodically. The project area generally falls within the Dry Zone and has characteristic land forms, soils and vegetation. With the progress of the Mahaweli Development Program, Pimburattawa irrigation scheme had also been integrated into the Mahaweli Project.

Under the Pimburattawa irrigation settlement scheme, settlers were brought to the area from different geocultural backgrounds. Some of them originated from this district while others have come from wet zone areas. Some of the settlers paddy lands extend right up to the banks of Kuda Oya stream.

The anticipated reforestation program covers about 16 KM riparian lands on either side of Kuda Oya stream from Pimburattawa spillway. This 16 Kms stretch has three distinct segments. Annexure 2 explains the physical features of the segments and the proposed forestry models adapted for different segments.

6.2. Project Objectives and concept

The Project is conceived to enhance the natural bio diversity in the largely agricultural landscape by restoring native dry-zone riparian forest vegetation in bands up to 40 meters wide on either side of the Kuda Oya. The outer fringes of this forest area adjacent to paddy fields, utility trees like fruits and medicinal trees are planted to provide non-destructive products of value to local residents. The primary purpose of the new forest, however, will be conservation rather than product production. The reforested area will be treated as a conservation forest rather than a production.

The concept of this project also includes a strong emphasis on participation of local residents especially the farmers adjacent to the reforestation areas. In this context, the cooperation and participation of farmer organizations and NGO is essential for project success and sustainability.

6.3 Project Concerns

*** Ecological Concerns**

Reforestation and maintenance of Dry Zone riparian forest ecosystems is a major goal of the project. This is based on the need for sustainability and preservation of bio-diversity.

*** Utilitarian Concerns**

Although it is not the primary objective of the project to develop production forests, it is desirable to incorporate in the planting program, useful plant species such as those used in indigenous medicines or for human and animal consumption.

*** Engineering concerns**

There is a need to introduce bank-stabilizing species that would help the checking erosion of the stream banks and dikes.

*** Environmental concerns**

The riparian forest will enhance the quality of the environment and increase the aesthetic aspects in the landscape. There is some concerns, however, that the forest will increase bird damage to nearby crops.

*** Training and education concerns**

Newly forested areas can serve as educational sites for local schools and as laboratories for university students and researchers. They can also serve as a demonstration site for extension education for local residents.

*** Sustainability concerns**

Care has to be taken to ensure that local residents see the forests as theirs to protect and maintain it after the project ends. For this reason, the involvement and participation of local residents in all phases of the project is mandatory.

6.4 Project Implementation plan

Based on above observations, a Term of Reference (TOR) was prepared for seeking offers from Sri Lankan Universities, for implementation of the program. Annexure 2 includes the TOR. This TOR outlined the concept and the process of implementation of all facets of the project including design, planting, monitoring and education of farmers. However, due to objections from an Assistant Conservator of forests and Mahaweli Environment Officer, implementation of the program was not entrusted to an university.

In the circumstances, MARD and MEA had to modify the plans and take over themselves the task of implementation of all aspects of the program in order to not lose the opportunity to establish the plants with the onset of 1993/94 Maha rain. But the planting work had to be limited to the first 8 Kms of Kuda Oya from spillway of Pimburattawa tank to the beginning of block 503. In this area most of the riverain vegetation have been removed at the construction stage of the irrigation and drainage system in 1983.

As a first step a riparian farmer organization which was named by farmers as "Kuda Oya Parisara Sanvidanaya (KOPS)" was formed. The membership of the organization was open to all riparian farmers along Kuda Oya numbering about 74. Of this total, 57 joined the KOPS. KOPS developed its own constitution, a copy which is in Annexure 1. Its committee has representation of farmers from all relevant areas of the settlement and leaders of the FO,s established under the Agrarian Service Act.

The president of the KOPS is a farmer with strong personality (Jayasiri Bandara) who is also heading a few other village level organizations. Farmers were trained for planting work by MEA nursery staff. Plants were supplied from the MEA nursery. Forest officer from MARD under the direction of MEA nursery manager supervised the planting program. Planting work was carried out on contracts given to the FO at an agreed rate with MEA.

7. Forestry works undertaken in Zone 1

In addition to reforest the deforested riparian lands along Kuda Oya in Zone 5, reforestation program was undertaken in Maha 1994/95 along streams which were improved under essential structural improvement (ESI) program under MARD. Under 1994 ESI program about 16 Kms of Menike Ela stream was improved.

Existing farmers organizations (FO) bordering Menike Ela were mobilized to undertake the forestry work in a limited scale. As an initial step of the only bamboo was introduced. Under this program number of awareness programs were held to introduce the concept. Selected members of FO,s were trained on nursery work. Women organizations of the area also participated in this program. Nurseries were started in June 1994 and planting of about 22,000 plants were completed in 1994/95 Maha.

8. Problems encountered and remedial actions taken

Damages to the newly established plants by fire during dry periods and buffalos were the main problem encountered during the implementations. Several awareness programs were held for farmers on the importance of forestry and on preventive measures against fires and they were encouraged to look after the forest. Field tours were also organized to take them to nearby forests. One strand

of barbed wires were provided from MEA/MARD for protection anticipating balance to be provided by the farmers.

During floods occurred in December 1994, large number of Bamboo plants were washed away in the Kuda Oya area. However Kumbuk trees were able to withstand the flood flows. Precautions were taken to avoid the high flood time in planting bamboo in other areas.

About 25% of the trees, mostly dry zone forestry trees planted along Kuda Oya, died during 1994 Yala season due to the drought. Farmers were encouraged to do irrigation.

9. Interim Evaluation on Kuda Oya Forestry Project

An interim evaluation was done on March 1994 on the project performance by a local NGO. Annexure 4 includes the report on the interim evaluation. Major recommendations of this evaluations were

1. With the onset of the dry spells and the long dry season, it is likely that most plants, particularly those on the dikes may face severe moisture stress. Plants should be irrigated by hand or by a mobile water pumps.
2. Action has to be taken to protect plants from buffalo and fire damage by providing at least one strand of barb wires. Farmers have to provide the other strand.
3. Provide some lands at Arunapura for the KOPS to start its own nursery. This should be a joint venture between the school and the KOPS.
4. Transfer all the major project activities in stages to the KOPS with necessary financial safe guard. This should be under agreement with provision for auditing and supervision by MEA/MARD.

Actions were taken to implement most of the recommendations. A report on a survey done on the progress of the project up to June 1994 are in Annexure 5.

10. Progress of riparian forestry program up to April 1995

28 farmers out of 56 members of the Kuda Oya Environmental FO actively participated in the program. Table 1 of the annexure 3 indicates the names of active members and the status of plants remained at the end of Maha 1994/95.

Altogether 80 Hectares of lands in Zone 1 & 5 were reforested with assistance of 10 FO,s. Total length of streams reforested is about 32 Kms. Trees planted include bank stabilizing trees like Bamboo and Kumbuk as well as dry zone forest trees like

Mee, Kohemmba, Ehela and Tamarind. Utilitytree planted include Coconut, Jack, Cane and medicinal plants. Awareness programs which included field tours, tree planting programs and site visits to successfully completed planted areas, were conducted for farmers as well as for school children in the area.

Along Menike Ela in Zone 5, about 22,000 bamboo trees which were produced in nurseries owned by farmers were planted in sections where the construction works are over under ESI program. Table 2 of the Annexure 4 indicates the details of areas under bamboo plantation.

At the initial stage of the project, farmers were paid for planting and maintenance of the forest. The total cost incurred per plant for the first two years was around Rs.35/=.

Attitude of farmers of already planted areas has now changed and they now do the planting and maintenance work voluntarily. For example the areas which was damaged by fire in Yala 1994 in Kuda Oya area were replanted with trees voluntarily, Only the plants were supplied by MEA. Farmers who planed bamboo trees are paid only for their nurseries and for planting. Maintenance is being done voluntarily.

Farmers in the Kuda Oya Environmental Organization has a capital of Rs 70,000/= earned from contract work for tree planting. They are now planning to invest the capital in an income generation activities. Profit of such activities will be distributed according to the share of their involvement in forestry work which would be measured based on the number of plants remained.

11. Recommendations for future expansion

System B is very sensitive ecological zone compare to other irrigation system under Mahaweli Project. It has bordering wild parks, floodplain national parks and protected villus. (Figure 2 in Annexure 2). Also the mass scale deforestation undertaken for irrigated agriculture development under Mahaweli Program has already disturbed the landscape as well as the flora and fauna in the area. Erosion and siltation of streams are very prominent because of structurally weak nature of soils in System B. Agriculture and other economic activities alongside the riverain areas and villus areas are becoming a threat to the natural balance of already disturbed sensitive eco-systems. Human Elephants conflict is also another importance aspect under consideration. Since 1986, over 31 people have been killed by elephants.

Environmental Preservations Plans for System B therefore should address all the component described above. Recommendation given below mainly focus only on future environmental mitigatory activities related riverain forestry.

11.1. Specific Recommendations :

- * Farmers living along Kuda Oya in Zone 5 and Menike Ela in Zone 1 have already been mobilized to undertake riparian forestry work through FO's. Therefore MEA should capitalize on this and should continue riverain forestry work introduced by MARD immediately.

In this effort the priority should be given to the areas where the farmers have already completed the plantation of bamboo along Menike Ela in Zone 5. Table 2 of Annexure 4 indicates the details of FO,s. Total number of forest trees such as Kumbuk, Mee to be supplied to the priority area is 20,000. Additional 1000 trees, like Coconut, Mango have to be given to grow in utility areas. Farmers are willing to plant and maintain these trees voluntarily.

At the same time nurseries for Bamboo can be started for the balance area along Menike Ela. Rs.7.50 has to be paid for each plant which include the cost of nursery work and planting. Total estimated requirement of bamboo plants is 20,000 for the 1995 program. As further incentive, utility trees can be issued to farmers who actively participated in tree planting.

- * Institutional Development Unit of MEA (System B), which is the responsible agency to continue the implementation of riparian forestry program after MARD, should take immediate step to strengthen the Kuda Oya farmer organization. Presently disunity is observed among few out of 30 active members of the organization. This could cause the organization to lose its momentum or even disband. Table 1 of Annexure 4 gives the details of active membership.
- * Kuda Oya FO, which has completed its second year in managing the forest reserve along Kuda Oya, has expressed its willingness to undertake the tree planting work in an reserved area of 30 Ha. for forestry in 503 and in another catchment area (15 Ha.) of a reservoir at the tail end of Branch Channel No. 1 in Damminna Block. As an economic incentive they have requested a portion (5%) to be used for ornamental fish pond and for animal husbandry. MEA should study the feasibility of their proposals and assist them to implement the projects.
- * Awareness programs organized by MARD for farmers in Zone & 5 on forestry and environment have been very effective in motivating them to participate in community forestry work. It is recommended these programs should be continued to other areas in System B.

11.2 General Recommendations

- * Total length of streams in Zone 1 & 5 is about 100 Km. Total reservation area is about 726 Ha. Table 3 in Annexure 4 indicates the details. About 80%

of the reserves allocated for those streams are encroached disturbing the riverain vegetation. Strict instruction should be issued to Block Offices to check this situation.

- * Income generation activities such as ornamental fish industry and animal husbandry can easily be incorporated with community forestry work along stream banks. For example when the streams runs through forest reserves which needs to be planted with trees, FO,s can be easily mobilized for the work by arranging incentives by allocating part of the reserve lands for income generation activities. MEA should take steps to explore possibilities of introducing such programs in consultation with other institutions like EIED, NLDB. Farmer organizations who participated and completed planting work in zone 1 & 5 should be given priority in introducing such a program because they have already mobilized for forestry work and also has a working capital.
- * Unless the farmers are shown short term and long term income generation potentials, it is difficult to get them to participate in forestry work. At the commencement of a planting program in a new area, farmers may have to be paid for planting and maintenance till they realize the value of enhancing the natural environment of the riverain system. Awareness programs and introduction of income generation possibilities etc. can also be used as strategies to mobilize their participation. MEA should allocate funds for mobilizing FO,s. Table 3 of Annexure 3 indicates a budget prepared for such a program which covers drainage streams on the whole left bank of System B.
- * With increased emphasis given to environmental programs, FO,s can apply for funds from various local and international funding agencies, NGO,s and volunteer organizations to start new projects. MEA should explore these possibilities and introduce these programs to FO,s. There are also NGO's which can assist FO's to coordinate with potential funding sources. MEA can get assistance from those NGO,s. MEA should encourage the participation of NGO,s in System B.

11.3 Recommendations for areas not yet developed for irrigation

- * It was observed in some areas in System B, that the required reservations for streams are not allocated at the land alienation stage. Designers of the land blocking out plans should be given clear guidelines about the requirements of reservations to be allocated.
- * In areas where the flooding occurs adjacent to the river banks, it is more economical and environmentally friendly to leave the lands not alienated than doing a mass scale drainage improvement damaging existing riverain forestry which stabilizes the natural eco-system. Designers of irrigation

systems should carefully study the situation and should try to allocate alternative lands outside the flooding areas rather than doing expensive river training works.

12. Conclusion

With recent emphasis given to the effects of development on natural environment, irrigation projects have been subject to much closer environmental scrutiny. Irrigation systems have to be designed and constructed or restored as water and soil conservation ecosystems rather than pure irrigated agriculture projects. Riparian forestry is only one component of the environment associated in agriculture landscape. Experience gathered during the implementation of the riparian project under the MARD program shows that similar environmental improvement needed in irrigation systems can be implemented with the participation of the farmer communities if such projects are carefully designed and properly implemented. Lessons learned from this project can also be used to expand similar forestry program in to other areas under the Mahaweli Project.

REFERENCES

1. James Tolisano. An environmental assessment of the MARD, MARD/MDS Project, March 1992.
2. Craig B.Davis. A wetland assessment of zone 1 & 5, MARD Project, August 1992.
3. Wetland site Report, Handapan Villu and Bendiya Villu, Publication of CEA, 1995
4. University of Sri Lanka, Peradeniya. Report prepared for the MARD on Riparian Forestry. June 1993.
5. Robert E.Tillman, United States Man and the Biosphere program and USAID, Environmental guidelines for irrigation.
6. Rohana Uluwishhewa, An environmental profile of Polonnaruwa District, A publication of CEA, August 1993.
7. Craig B.Davis. A wetland development reforestation and pesticide residue assessment in System B, MARD Project, June 1994.
7. P.A.G.Paranamana and D.L.O.Mendis. Environmental Impact Assessment study of an ancient water and soil conservation ecosystem (irrigation system), Volume 1 of Transaction of the Institution of Engineers, Sri Lanka, 1994.
8. Mahinda Panapitiya, Drainage improvement in Pilot area, 4 KM of Menike Ela outlet drain in zone 1.MARD/MDS Project, May 1991.
9. Louis Berger International Inc., Main Drainage System - Left Bank- Zone 1,2,3,4A & 5. July 1987

ANNEXURE 1

KUDA OYA REFORESTATION PROJECT

Farmer's Meeting
June 12, 1993, 4:30 - 6:00 pm

House of Farmer Somadasa near Kuda Oya Causeway, Wijayabapura Block. Meeting was held in a home garden under the shade of coconut trees.

Attendance: 55 farmers (including 23 riparian farmers and 15 Farmer Organization leaders)

Meeting was convened by Mr. Mahinda Panapitiya at 4:30 pm

AGENDA

Introduction of Farm Leaders, Officials, and Visitors by
Wijayabapura Block Manager Mr. P. I. Chandrabose.

Welcome in Sinhala by MARD Chief of Party, Mr. Bruce Spake

"I wish to welcome everybody cordially on behalf of MARD. MARD project has always been working in close cooperation with farmers. Today's meeting is also for the same purpose. I wish all success for the deliberations of the meeting."

Meeting Objectives Professor C. M. Madduma Bandara,
University of Peradeniya

Explained the value and need for having farmers involved in programme and the importance of having MEA, MARD, a Sri Lankan University, and the farmers working together. Explained the purpose reforestation project and said that from the planning stage onward the participation of the farmers is essential. Noted the need for concrete action at this, the third farmer meeting. Explained that Farmer Organization leaders and farmers adjacent to the Kuda Oya (riparian farmers) are essential participants and this is why they were invited. This group should get together to plan the next step.

Open Discussion - led by Mr. U. G. Abeygunawardena, MARD
Farmer Organization Specialist.

Discussion

Mr. U. G. Abeygunawardena noted that this project is the farmer's project and that we are only facilitating it. The floor was opened for discussion

K. M. B. Gunarathana, Chairman, Pimburattewa Farm Organization -
- Explained what happened in earlier meetings and noted that just planting a plant is not enough and that fencing is necessary on both sides of the dikes is necessary. He also noted that the riparian farmers are important in this project and they should be given the responsibility for looking after the forest. Further, he noted that the farmers should be made to understand that there is an economic return from the project, that the farm organizations can shoulder part of the responsibility, and that this is a good program and it can be useful even for the next generation.

G. M. J. Bandara from Arunapura said that about 600 meters of his paddy field is adjoining the stream and that he has already started planting trees on his land and has requested assistance from the MASL in support his efforts. He said that "avenue planting program" was not successful, because it lacked community participation. He noted that he hailed from Galaewela village where there had been a very successful teak plantation where land had been leased for five years to farmers who were expected to plant and look after teak trees in exchange for being allowed to interplant their own crops. He said that the plant species chosen for the Kuda Oya should fit into the environment. When the canal is closed the plants may die of dryness. Plants can also be destroyed by buffalo, therefore, barbed wire fencing is necessary. He suggested giving trees to farmers who would plant them on their land. He referred to an environmental cartoon that he has seen: A politician comes and plants a tree and goes away, then a goat turns up and eats the tree. Then finally a dog comes and waters it. And the dog says 'now we are the people who are looking after it'. He said we should not let this happen on this project.

Other farmers noted that there are no dikes in some areas and that dikes should be extended into those (unchannelized) areas. One farmers said that after the dikes are made floods decrease, but there are a lot of anicuts downstream that should be removed. Another farmer, suggested that riparian lands should be divided among and made the responsibility of the farm organizations.

After some discussion, the farmers resolved that a riparian farmer group should be established. Names of proposer and seconder have been recorded by the interim secretary, Mr. G. M. J. Bandara. They also resolved that the membership of the group should comprise all riparian farmers and representatives of Farm Organizations. They appointed an advisory group (including leaders of Farmer Organizations, MEA and MARD representative, District Forest Officer, and Buddhist clergy and school principals in the area) and an action committee (see notes of G. M. J. Bandara, Interim Secretary). The Action Committee shall comprised two riparian farmers nominated by each Farmer Organization in the Kuda Oya. Further, it was resolved that a meeting of the full membership should be held in the near future to adopt by-laws and elect office bearers.

It was agreed that Mr. G. M. J. Bandara should serve as contact person for the farmers on this project until formal office bearers are elected.

Participants were thanked for their participation and the meeting was adjourned at about 6:00 pm.

MEA and MARD Staff Present

FARMER ORGANIZATION Officers and Members Present

RIPARIAN FARMERS

<u>Name</u>	<u>Address</u>	<u>Location of the Farm Land</u>
1. M.B. Yatiwella	No. 23 Diuldamana	40
2. G.M.J. Bandara	98, Arunapura	Near Kuda Oya Arunapura
3. A.M. Thilakaratne Adikari	04 A Diuldamana	18
4. W.M. Tikiribanda	Ihalawewa	141
5. G.G.Nandesena	Ihalawewa	34
6. E.M.G. Ranathunga Banda	Ihalawewa	33
7. W.M. Kudabanda	Ihalawewa	31
8. E.M.T.G. Ekanayake	Ihalawewa	22
9. M.A. Jinadasa	yaya 6	46
10. A.P.John	yaya 6	77
11. P.G. Pediris	Yaya	yaya 4
12. E.H.M. Heenbanda	yaya 01	210
13. Mallika Heenmenike	yaya 6	74
14.B.G.Sodina	yaya 4	55
15. E.G. Dingiribandu	yaya 4	88
16. E.M.M.Anula Kumari	yaya 6	76
17.H. Jemis	yaya 4	59
18. T.M.Ubayasena	yaya 4	11
19. T.A. Saimonsingcho	yaya 4	16
20. K.Y.Herath	yaya 4	34
21.H.M. Ananda	yaya 6	80
22. K.M.G. H.Kumara	yaya 6	129
23. A.G. Gunawardana	yaya 6	98
24. P.G. Chandrasena	yaya 6	96

25. R.G. Lalith Mahinda	yaya 6	97
26. P.K.Somadasa	yaya 4	
27. P.L.D.Liyanage	yaya 6	
28. W.G.Ukkubanda	yaya 6	
29. A.G.Premaratne	yaya 7	
30. K.M.B.Gunaratne	Pimburattewa	
31. U. Iranganee Herath	FA/Pimburattewa	
32. S.M.A. Wijewickrama	yaya 6	30
33. A.P. J. Karunaratne	yaya 6	77
34. P.G.Rammalhamy	yaya 6	45
35. K.B.Heenbanda (Treasure)	yaya 6	
36. W.M.Abeyratne Warapitiya	yaya 6	34
37. J.A. Somaratne	yaya 1	44
38. G.G.Upasena	yaya 7	
39. D.M.Ukkubanda	yaya 7	120
40. N.B.Wickramasinghe	yaya 6	122

<u>Name</u>	<u>officer</u>
1. A.H.A.A.De.Silva	Agriculture Officer
2. A.P.L.S.De. Silva	Agriculture Officer
3.J.M.D.J. Bandara	Actg. I.E.Damminna
4. M.G.Wimalasena	Field Assistant
5. M.A.G.T. Bandara	Field Assistant
6. W.M.Punchibanda	Unit Manager,Devagama
7. P.I.Chandrabose	Act. Block Manager,Wijeyabapura
8. H.A.S.De. Silva	Block Manager,Damminna
9. M.D.Ellepola	DRPM/G
10. L.M.Mudiyanse	No. 15
11. J.D.Saimansingcho	
12. M.M.Ranbanda	yaya 4
13. K.K.Dauglas	yaya 4
14. R.D. Ariyaratne	Arunapura
15. P.G.Piyuadasa	Arunapura

කුඩා ණය පරිසර සංවිධානයේ අතුරු වාර්ෂික වාර්තාව

1. නම:- කුඩා ණය පරිසර සංවිධානය

2. ලිපිනය:- ජනක කාර්යාලය, අරුණපුර, දිවුල්ලපහ

3. බල ප්‍රදේශය:- දැමිණින්න, විජයබාගුරු කොට්ඨාශ මායිම් කිරීම

4. පිටපත්:- ස්වාධීන පරීක්ෂකවරයාගේ සහ සාමාජිකයන්ගේ සඳහා අවශ්‍ය පරිදි පරිසරය පදනමක් මත ගැනීම සඳහාත්, කැමැත්තෙන් සිදුකරන නීතිමය රෙගුලාසි ගැනීම සඳහාත් සිදුකර ගැනීම සඳහාත්, ඉහල පහල හා මැද පටුම්වල ප්‍රවේශයන්ගේ ගස් වගා කිරීමේ ක්‍රම අනුගමනය කිරීමෙන්, ගම්පහ, ඇල මායිම් වල, වැව් කාලු වල සහ පුරාණ පවුල්වල වන කැමැත්තෙන් සහිත ගෙවතු ආදිය මගින් ජල සම්පත් මනව සහ ස්වාභාවික තත්ත්වය ආරක්ෂා කර ගැනීමේදී සහ ආකාරයේ ගොඩනැගීමට ගැනීමේදී සහ වන වගා පිළිබඳ සැලසුම් කිරීම හා ක්‍රියාත්මක කිරීම.

5. සාමාජිකත්වය:- i. සමස්ත බල ප්‍රදේශයේ අයත් පිටපත් ඉඩම්ලාභීන්/ලාභිණියන්ට සමස්ත පුරුණ සාමාජිකත්වය ලබා ගැනීමට අයිතිය ඇත.

ii. ඉඩම්ලාභී නොවන වහන්සේ බල ප්‍රදේශයේ ඉඩම් වගා කරන්නන්ට අර්ධ සාමාජිකත්වය ලබාගත හැකිය. වහන්සේ ඔවුන්ට ඡන්ද බලය හිමි නොවේ.

iii. වත් සාමාජිකයෙකුට ඇත්තේ වත් ඡන්ද බලයක් පමණි.

6. සාමාජිකත්වය අහිමිවීම:-

වාර්ෂික විවේචන කවුලකු කරන හෝ සමස්ත දිවුල්ල පවුලකුට වගා කරන හෝ පරිසර වන වගා පදනමේ නිර්මාණ රෙගුලාසි පිළිබඳ සාමාජිකයන්ගේ සාමාජිකත්වය අහිමි කිරීමට හෝ අහිමි කෙරෙනු ඇත.

7. (අ). වගකීම් හා බලතල:- (සම්බන්ධයෙන් සහ සහාය)

- i. සම්බන්ධයෙන් වැරදිව පවතින හා කාරක නියෝග පාලන වෙනස් කිරීම සංශෝධනය කිරීම අනුමත කිරීම.
- ii. මුදල් හා අනෙකුත් කටයුතු පිළිබඳ ප්‍රතිපත්තිමය තීරණ ගැනීම.
- iii. වාර්ෂික අවසාන වාර්තාව අනුමත කිරීම, සංශෝධනය කිරීම ප්‍රතිසමය කිරීම.
- iv. ක්‍රියාකාරී ව්‍යාපෘති සහායක වශයෙන් කටයුතු වලට සහභාගී වීම හා කටයුතු වලින් ඉවත් කිරීම.
- v. බලතල පැවරීම හා ආපසු ලබාගැනීම
- vi. සම්බන්ධ බල ප්‍රදේශයේ පොදු දේපල ආරක්ෂා කිරීමට පියවර ගැනීම.
- vii. සාමාජිකයන්ගේ පවුල් වල සුභසාධනය සඳහා අවශ්‍ය වන තීරණ ගැනීම.
- viii. වගා ව්‍යාපාර පද්ධතියේ (ඇලවේල) නිසිකාරණය නඩත්තු කරවීමට වගබලා ගැනීම.
- ix. අනවසරයෙන් වනවිට බිම්වලට හා වගාවට හානි පමුණුවන්නන් පිළිබඳ ක්‍රියා කිරීම ගැනීම.

7. (ආ). සහ සහාය කැඳවීම:-

- i. සහ සහාය කැඳවීමේ වගකීම ලේකම් සතු වන අතර ඔහු නිලධාරී සංවිලසක් පත්කර ගන්නා තෙක් සහ සහාය කැඳවීමේ කාර්යයන් සම්බන්ධයෙන් නායකයා කටයුතු කල යුතුය.

ii. භග සභාව කැඳවීමට දින 10 කට කලින් භග සභාව රැස්වීමට ඉතුරු දිනක, ස්ථානක, වේලාව සහ සාකච්ඡා කිරීමට බලාපොරොත්තු වන කරුණු පිළිබඳව සාමාජිකයන්ට දැන ගැනීමට සැලැස්වීමට ඉතුරු.

iii. භග තුනකට වරක් භග සභාව රැස්වීමට ඉතුරු අතර සාමාජිකයන් ඉල්ලා පිටින් නම් වීමේ භග සභා රැස්වීමේ කැඳවීමට කැඳවුම්කරු බැඳී සිටී. කෙසේ වුවද එවැනි රැස්වීමේ කැඳවීමට නම් මුල සාමාජික සංඛ්‍යාවෙන් 1/3 ක් (තුනෙන් එකක්) හෝ තිස් දෙනෙකු සහ දෙසීන් අඩු සංඛ්‍යාවකගේ ලිඛිත ඉල්ලුමක් ඉදිරිපත් වීමට ඉතුරු.

8. ක්‍රියාකාරී විධායක කමිටුව තෙවන කාරක සභා හා අනුකාරක සභා:-

(අ) ක්‍රියාකාරී විධායක කමිටුව (කාරක සභාව):-

1. ක්‍රියාකාරී විධායක කමිටුව:-

සභාපති
උප සභාපති
ලේකම්
උප ලේකම්
භාණ්ඩාගාරික
කාර්ය සහතික මංවලයකින්ද ඉතුරුවේ.

2. සාමාජිකයන්ගේ වැඩි ඡන්දයෙන් පත්වන නායකයා ක්‍රියාකාරී විධායක කමිටුවේ සභාපති වේ.

3. සංවිධානයේ සාමාජිකයන්ගේ වැඩි ඡන්දයෙන් පත්වන සංවිධාන නායකයෝ නිල බලයෙන්ම කාරක සහතිකයෝ වෙති.

(ආ). ක්‍රියාකාරී විධායක කමිටුවේ වගකීම් හා බලතල:-

i. භග සභාව විසින් ගනු ලබන තීරණ ක්‍රියාත්මක කිරීම.

ii. මහ සභාවේ අනුමැතියට යටත්ව නව සාමාජිකයන් බඳවා ගැනීම.

iii. ක්‍රියාකාරී අනු කාරක සභා පත්කිරීම, එම අනු කාරක සභා සඳහා සභාපතිවරුන් පත්කිරීම අදාළ තනතුරු වලින් ඉවත් කිරීම, අනු කාරක සභා සඳහා සාමාජිකයන් පත් කිරීමේදී කාරක සභාවෙන්

පිටත්කර විශේෂ දැනුම හා පලපුරුද්ද ඇති සාමාජිකයන් පත්කිරීම බලස ක්‍රියාකාරී විධායක සභාව සතු වේ.

iv. අදාළ අනුකාරක සභා ලවා වාර්ෂික ඉලක්ක හා සැලසුම් පිළියෙල කිරීම හා එම සැලසුම් ආශ්‍රයෙන් ඒකාබද්ධ වාර්ෂික වාර්ෂ සැලැස්ම සකස් කිරීම.

v. සාමාජික මුදල් හා පමිතියේ වෙනත් අරමුදල් නිසි පරිදි පාලනය කිරීම.

vi. පොදු දේපල ආරක්ෂා කිරීම.

vii. පමිතියේ දිගු ඉරට බාධා කරන හෝ සංවිධානයේ සංවර්ධන සැලසුම් නිසි පරිදි ක්‍රියාත්මක කිරීමට අවහිර කරන හෝ පොදු තීරණ වලට පවතැනිව කටයුතු කරන සාමාජිකයින් පිළිබඳව හසුනු පරිදි කටයුතු කිරීම.

(ඇ). සභාපති සතු වගකීම:-

i. මහ සභා හා කාරක සභා රැස්වීම් වල මුලසුන දැරීම හා එම රැස්වීම් මෙහෙයවීම.

ii. අත්පත්ව ඇති අවස්ථාවක මහ සභාව හෝ කාරක සභාව කැඳවීම සඳහා ශ්‍රේණිමය පිහිටි කටයුතු කිරීම.

iii. පරිසර පමිතියේ මූලික පරමාර්ථ ඉටුකර ගැනීම සඳහා නිලධාරී මංගලය අනුකාරක සභා හා සාමාජිකයන්ව මෙහෙයවීම.

iv. භග සභාව විසින් පමණක කර ගන්නා ප්‍රතිපත්ති හා විධි විධාන පලව අනුකූලව විනය පරිපෂණ පැවැත්වීම.

v. යටෝක්ත පොදුකාර්යය සාදන සැලැස්මේ පිටපත් අදාල නිලධාරීන්ට සහ ආයතන වලට සැපයීම.

(ඇ). ශ්‍රේණිපි සතු වගකීම හා බලතල:-

i. හරු සභාපතිගේ පූර්ණ අනුමැතිය පමණක සභා හා කාර්යසාධන රැස්වීම් කැඳවීම.

ii. පවසන සංවිධානයේ ලිපිලේඛණ පවත්වා ගැනීම හා සභා සභා කාර්ය සහ රැස්වීම් වාර්තාගත කිරීම හා ඉදිරිපත් කිරීම.

iii. සභා සභා කාර්ය සහ රැස්වීම් වලට සහභාගි වෙත අය සඳහා පැමිණීමේ ලේඛණ නවත්තු කිරීම.

iv. සාමාජික ලේඛණයක් පවත්වාගෙන යාම.

v. සමිතියේ පරමාර්ථ ඉටුකර ගැනීමට අවශ්‍ය සැසි සභාපති විසින් නියෝග කරනු ලබන වෙනත් කටයුතු හා සභාපතිගේ වගකීම් ඉටු කිරීමට අවශ්‍ය පූර්ණ සහයෝගය දීම.

(ඉ). භාණ්ඩාගාරික සතු බලතල:-

i. සාමාජික මුදල් අයකර ගැනීම, ගෙවීම් කටයුතු හා මුදල් ලේඛණය නවත්තු කිරීම.

ii. වාර්ෂික අයවැය ලේඛණය සකස් කිරීම කාර්ය සභාවේ (ක්‍රියාකාරී විධායක කමිටුවේ) අනුමැතිය ලබා සභාපති ඉදිරිපත් කිරීම.

iii. කාර්ය සභා අනුමැතිය පමණක මුදල් වැය කිරීම හා වස ගනුදෙනු වල නීත්‍යානුකූලභාවය තහවුරු කිරීම පිණිස බලපත් හා අනෙකුත් ලියකිරීම් කළා ගැනීම.

iv. බැංකු ගනුදෙනු වලදී සහායක හා ශ්‍රේණි සහග ජනාකර්ම කරනු ලබන ස්වභාවය.

v. ක්‍රියාකාරී ව්‍යවස්ථාපිත කමිටුව විසින් සම්මත කරගනු ලැබූ විධි ව්‍යවස්ථාපිත වලට අනුකූලව පුද්ගලිකව පරීක්ෂණය කිරීම.

(ඊ). අනෙකුත් බලධාරීන් සතු වගකීම්:-

i. සමිතියේ සාමාජිකයන් ඉටුකර ගැනීමට හෝ සහායකයන්ගේ සහයෝගය ලබාදීම.

ii. සමිතියේ උත්තරීතර අවශ්‍යවේ යැයි සහායකයන් විසින් නිශ්චය කොට පවරනු ලබන වගකීම් ඉටු කිරීම.

(උ). සාමාජිකයන් සතු වගකීම් හා බලතල:-

i. පරිසර සංවිධානයේ සාමාජිකයන්ගේ වැඩ කැමැත්ත පරිදි පරිසර සංවිධානයේ නායක තෝරා ගැනීම.

ii. බල ප්‍රදේශ පවරවීමේදී වැඩි ඡන්දයෙන් එහි නායකයා තෝරා ගැනීම.

iii. හෙ සහායකයන්ගේ අනෙකුත් නිලධාරීන් තෝරා ගැනීම හා ඉවත් කිරීම.

iv. නායකයන් හා නිලධාරීන් තෝරා ගැනීමේදී සංවිධානයේ අභිරුචියට වඩා හිතකර යැයි සැලකෙන දේවල් පමණක් තෝරා ගැනීම. සාමාජිකයන්ගේ ප්‍රබලතා වගකීමකි.

v. ශ්‍රේණි විසින් හෝ වෙනත් නිත්‍යානුකූල බලය පවරනු ලැබ ඇති කාර්යක්ෂමතාවයන් විසින් කැඳවනු ලබන රැස්වීම් වලට නිසි පරිදි සහභාගී වීම.

vi. විනය ගරුක වීම.

vii. පරිසර සංවිධානයේ නායකයාගේ ක්‍රියාකලාපයෙන් අලුත්විය හැකි අසාධාරණයක් පිටුවහලක් යැයි සැලකෙන්නේ නම් විනය කමිටුවට ලිඛිතව දැන්වීම.

viii. විනය පරීක්ෂණ වලදී ගනු ලබන තීරණ වලට අවනත වීම හා එම තීරණවලට පවතැනි ධ්වනිකරණ ලැබුණහොත් පමිතියම මගින් ගනු ලබන කුමන තීරණයක් ඉටු පිලිගැනීම.

(උ) අනුකාරක සහාය සේවකයන්ගේ කාර්ය:-

i. සහකාර පදවන අනුකාරක සහාය සංවිධානයේ පමිතියම අනුමත කර ගැනීම සහ එහි ප්‍රතිඵලයක් ලෙසින් අවස්ථානෝචිතව ස්වකාරී විධායක සහාය තීරණය කරන පරිදි අනුකාරක සහාය නම් වෙනස් කල හැකිය.

i. වගා සැලසුම් අනුකාරක සහාය

ii. ගාස්තු කොට්ඨාස ගැනීම හා වෙන්වීම සම්බන්ධ අනුකාරක සහාය

iii. විනය පරීක්ෂණ අනුකාරක සහාය

9. සංගමයට අරමුදල ලබාගැනීම:- සහකාර සඳහන් චාරිත්‍රවලින් අරමුදල ලබාගැනීම කලහැක.

i. සාමාජික මුදල

ii. ස්වේච්ඡාදායක මුදල ලබන ආකාරයට

iii. විදේශ කාර්යාල හා වෙනත් ස්ථානයන්ගෙන් හෝ පුද්ගලයන්ගෙන් ලැබෙන මුදල මගින් ආදායම ආවේණිකව හෝ දුරස්ථව ආදායම.

iv. කාරක සභාවේ තීරණය මත වෙනත් ආදායම් ඉටුපිටි කුමන මගින් ලැබෙන මුදල හෝ වෙනත් මුදල හා නිත්‍යානුකූලව ලැබෙන ආදායම් හා වෙනත් ආදායම්.

10. මුදල කැන්සල් කිරීම හා ආපසු ලබාගැනීම:-

i. සංවිධානය සතු අරමුදල මත සභාවේ කැමැත්ත අනුව අවස්ථානේ ඇති බැංකුක කැන්සල් කල හැකිය.

ii. කාණ්ඩාගාරික හා ලේකම් හෝ සහායක සහ සේවකයන්ගෙන් එක් අයෙකුද වෙස්සන් සඳහා සහ බැංකු ගනුදෙනු සඳහා අත්සන් දෙවීම හැකිය.

11. ලාභ අලාභ ගිණුම් සකස් කිරීම:-

i. සංගමයේ ආදායම් වර්ෂය ජනවාරි මස 1 දායින් ඇරඹී දෙසැම්බර් 31 දායින් අවසන් වේ.

ii. එම ආදායම් වර්ෂයේ අවසානයේ භාණ්ඩාගාරික විසින් ක්‍රියාකාරී විධායක කමිටුව වෙත ලාභ අලාභ ගිණුම් ඉදිරිපත් කල යුතුය. එයින් අනුමත කෙරෙන එකී ගිණුම් ආදායම් වර්ෂය අවසන් වීමෙන් පසුව පැවැත්වෙන මහ සභා රැස්වීමට ඉදිරිපත් කල යුතුය.

12. විගණන වාර්තාව:-

විගණනය වසරක් පාසා කල යුතු අතර එම කාර්ය මුදල් වර්ෂය අවසානයේදී ක්‍රියාත්මක කල යුතුය.

13. ව්‍යවස්ථා සංශෝධනය:-

i. මෙම ව්‍යවස්ථා සංශෝධනය කිරීම වෙනස් කිරීම කොටස් වශයෙන් හෝ සම්පූර්ණයෙන් ඉවත් කිරීම හෝ නව ව්‍යවස්ථාවක් කෝටා ගැනීම කල යුත්තේ ඒ සඳහා කැඳවනු ලබන විශේෂ මහසභා රැස්වීමකදී සාමාජිකයන්ගේ 2/3 ක වැඩි ඡන්දයෙන් සම්මතකර ගැනීමෙන්ය.

ii. ව්‍යවස්ථා සංශෝධනය සඳහා කල් දීමක් කල යුතුය.

14. මහ සභාව විසින් අනුමත කරන ලද ව්‍යවස්ථා සංශෝධන පරිසර අධිකාරියේ ලියාපදිංචි කල යුතුය.

ANNEXUE 2

REQUEST FOR QUOTATIONS

RFQ Number: MARD II - 001

Offer Deadline: 21:00 hours July 23, 1993

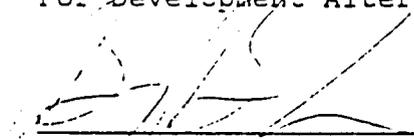
Development Alternatives, Inc. (DAI), a Washington-based corporation specializing in international rural and agricultural development, acting on behalf of the Mahaweli Agriculture and Rural Development Project of the Mahaweli Authority of Sri Lanka, is soliciting offers for the supply of services as described in Section B. Terms and Conditions of Subcontract. These services are required for the above-mentioned project (Contract No. 383-0086-C-00-3005-00) which is financed by the U.S. Government (Agency for International Development).

This RFQ includes the following sections:

- A. Instructions to Offerers
- B. Terms and Conditions of Subcontract

All correspondence and/or inquiries regarding this request for quotations must reference the above RFQ number, and be directed to the attention of the undersigned.

For Development Alternatives, Inc.



Bruce Spake
Chief of Party
MARD II
Pimburattewa

MAHAWELI AGRICULTURE AND RURAL DEVELOPMENT PROJECT
KUDA OYA REFORESTATION PROJECT

Project Description and Specifications

TABLE OF CONTENTS

Part A: INSTRUCTIONS TO OFFERORS

1. INTRODUCTION
2. PREPARATION OF QUOTATIONS
3. VALIDITY PERIOD
4. REQUIRED OFFER FORMAT
5. NEGOTIATION
6. BASIS OF AWARD
7. TERMS OF SUBCONTRACT

PART B: TERMS AND CONDITIONS OF SUBCONTRACT AGREEMENT: Background and
Terms of Reference for Kuda Oya Reforestation Project

1. PROJECT AREA
2. PROJECT OBJECTIVE AND CONCEPT
3. PROJECT CONCERNS
4. REFCRESTATION STRATEGIES
5. COMMUNITY PARTICIPATION
6. BASELINE SURVEYS AND LAND USE MAPPING
7. MANAGEMENT PLAN
8. WORK SCHEDULE
9. BUDGET
10. PERSONNEL SCHEDULE
11. REPORTS AND PRODUCTS
12. PERIOD OF SUBCONTRACT
13. SUMMARY OF PROPOSAL REQUIREMENTS

PART A: INSTRUCTIONS TO OFFERORS

1. Introduction:

The Mahaweli Agriculture and Rural Development Project (MARD) of the Mahaweli Authority of Sri Lanka (MASL) requests a proposal from designated Sri Lankan universities to contribute to the Kuda Oya Sub Project according to the attached terms of reference.

The fixed price agreement will be financed by the United States Agency for International Development (AID), under Contract No. 383-0086-C-00-3005-00.

Offerors will not be reimbursed for any costs incurred in connection with the preparation and submission of their quotes.

Offerors should note that payment will be made in Sri Lankan currency in accordance with Sri Lankan law.

A response must be received by 21:00 hours on July 23 at the following address. Telefax or telex responses are acceptable:

MARD Project
Development Alternatives, Inc.
Pimburattewa via Polonnaruwa
Tel. No./Fax No. 027-2174
Attn: Bruce Spake (RFQ MARD II - 001)

2. Preparation of Quotations:

Offerors are expected to examine the specifications and all instructions contained in the Request for Quotations. Failure to do so will be at the offerors' risk.

All correspondence in connection with the quotation and the subcontract is to be in English.

3. Validity Period:

Your offer must remain valid for not less than 45 calendar days after the offer deadline specified above. Offers submitted with a validity period of less than 45 days will be considered non-responsive.

4. Required Offer Format:

Your detailed offer must clearly demonstrate corporate capability and capacity of staff to perform the needed tasks. You must also submit a budget which includes all costs, including salaries, social charges, fee, and other direct costs (local travel, per diem, educational materials, training, tree planting and maintenance costs) associated with providing the deliverables described in the section entitled Reports and Products. These costs should be provided in sufficient detail for DAI to evaluate reasonableness and completeness.

Offeror will provide a one to two page description of the corporate capability in providing the type of services required in the subcontract and in managing interdisciplinary activities.

Offeror will provide a one to three page Curriculum Vita of the individuals proposed along with an estimate of the time to be spent by each individual.

Offeror may make a counter offer if it disagrees with the suggested level of effort and staffing pattern.

5. Negotiations:

Best-offer quotations are requested, and it is anticipated that awards will be made solely on the basis of the offer. However, the buyer reserves the right to conduct negotiations prior to award.

6. Basis of Award:

Awards will be made to responsible offerors submitting responsive offers judged to be most advantageous to the buyer in terms of cost and capability. Offerors are expected to provide quotations for the total level of work specified in Section B; however, the buyer reserves the right to make awards for quantities less than those specified or offered.

The buyer, Development Alternatives, Inc., will reject any offer that is non-responsive. A responsive offer is one that complies with all terms and conditions of the RFQ without material modification. The buyer may waive any minor informality in an offer that does not constitute material modification.

The buyer reserves the right to adjust the proposed level of effort.

Any offer that does not conform to the foregoing instructions may be rejected.

7. Terms of Subcontract:

This is a Request for Quotations only, and in no way obligates Development Alternatives, Inc. to award any subcontract. If a subcontract is awarded as the result of your offer, the terms and conditions of the RFQ will become integral to the subcontract.

PART B. TERMS AND CONDITIONS OF Fixed Price Agreement

The Mahaweli Agriculture and Rural Development Project (MARD) of the Mahaweli Authority of Sri Lanka (MASL) is an integrated agricultural development project covering the 12,000 hectares of the Mahaweli System 'B' irrigation area. The goal of the project is to obtain maximum economic benefits from land and water resources available to settlers in System 'B'. The purpose is to increase settler incomes through heightened resource productivity, improved terms of trade with input suppliers and produce buyers, and linkages into commercial production channels.

Background and Terms of Reference for Kuda Oya Reforestation Project.

1.0 PROJECT AREA

1.1. Background

The Kuda Oya is a left bank tributary of the Maduru Oya (Figs. 1 and 2). With the construction of the Pimburattawa reservoir in the 1950s, the Kuda Oya was dammed in its upper reaches. The present channel of the Kuda Oya beginning from the Pimburattawa dam si collects water from the spill-way and drainage waters from the paddy fields on its either side. The terrain of the Kuda Oya Basin and the surrounding area is low-lying with marshy conditions. The streams tend to braid and meander and change their courses periodically. The project area generally falls within the Dry Zone and has characteristic land forms, soils and vegetation. With the progress of the Mahaweli Development Program, Pimburattawa irrigation scheme had also been integrated into the Mahaweli Project.

Under the Pimburattawa irrigation settlement scheme, settlers were brought to the area from different geocultural backgrounds. Some of them originated from this district while others have come from wet zone areas. Some of the settlers' paddy lands extend right up to the banks of Kuda Oya. At present farmers are organized into Farmer Organizations under the Agrarian Services Act.

The anticipated reforestation program covers about 10 Kilometers of riparian lands on either side of the Kuda Oya from the Pimburattawa spillway. This 10 Kilometer stretch has three distinct segments.

1.2. The Undeveloped Segment (UDS)

This covers the first two kilometers from the Pimburattawa spill way. Little of the original riparian forest remains in this stretch but parts of the riparian lands in this area have been replanted by the MEA with acacia and eucalyptus. There are hardly any farmlands in this stretch except for a small settlement at Damminna.

1.3. The Channelized Segment (CHS)

- The next six kilometers of the river were channelized during the development of block 502. In this area all the trees were removed and dikes were constructed on either side to prevent flooding. In some places the natural meanders of the river were cut off, leaving oxbows outside the dikes. In several places dikes are breached and let drainage waters from the paddy fields flow into the Kuda Oya. The distance between the dikes is approximately 60 meters and occupied by the meandering channel of the Kuda Oya. In some places the meanders are beginning to undercut the toe of the dikes.

1.4. The Non-Channelized Segment (NCS)

The next two kilometers downstream were not diked during the early period of development and the river has cut a deep and erosive channel with wide meanders. Flood waters emerging from the upstream channelized section inundate the low lying areas threatening adjacent agricultural lands. This segment is earmarked for improvement in conjunction with irrigation and drainage infrastructural development planned for block 503. However, it is anticipated that these improvements will be designed so as to conserve existing riparian zone trees by placing dikes as far from the river as possible.

2.0. PROJECT OBJECTIVE AND CONCEPT

- The objective of the project is to reforest approximately 10 km² of riparian land on either side of the Kuda Oya immediately downstream from the Pimburattewa dam in Zone 5 of System B (Figs. 1 and 2), with the CHS (see 1.3 above) being a priority for reforestation.
- The project was conceived to enhance natural biodiversity in the largely agricultural landscape by restoring native, dry-zone riparian forest vegetation in bands up to 40 meters wide on either side of the Kuda Oya. The outer fringes of this forest are adjacent to fields and paddy, fruit and medicinal trees will be planted to provide non-destructive products of value to local residents. The primary purpose of the new forest, however, will be conservation rather than product production. The reforested areas will be treated as a conservation forest rather than a production forest.
- The concept of this project also includes a strong emphasis on the participation of local residents, especially the farmers adjacent to the reforestation areas. In this context, the cooperation and participation of farmer organizations and NGOs is essential for project success and sustainability.

3.0. PROJECT CONCERNS

3.1. Ecological Concerns

Restoration and maintenance of Dry Zone riparian forest ecosystems is a major goal of the project. This is based on the need for sustainability and preservation of bio-diversity.

3.2 Utilitarian Concerns

Although it is not the primary objective of the project to develop production forests, it is desirable to incorporate in the planting program, useful plant species such as those used in indigenous medicines or for human and animal consumption.

3.3. Engineering Concerns

There is a need to introduce bank-stabilizing species that would help in checking erosion of the stream banks and dikes.

3.4. Environmental Concerns

The riparian forest will enhance wildlife habitat and improve the quality of life for local residents by providing accessible natural areas. There is some concern, however, that the forest will increase bird damage to nearby crops. attraction of birds and wildlife into the reforested area.

3.5. Training and Education Concerns

Newly forested areas can serve as educational sites for local schools and as laboratories for university students and researchers. They can also serve as demonstration sites for extension education for local residents.

3.6. Sustainability Concerns

The project should be designed in such a way as to maximize the sustainability of the new forests and its benefit to the local community. Care must be taken to ensure that local residents see the forest as theirs to protect and maintain it after this project ends. For this reason, the involvement and participation of local residents in all phases of the project is mandatory.

4.0. REFORESTATION STRATEGIES

Reforestation strategies must address the particular needs of each segment of the river as follows:

4.1. CHANNELIZED SEGMENT (CHS)

4.1.1 Site conditions

The stream which meanders within the dikes in this zone carries a heavy load of water (up to 2 meters deep) during the rainy season when the Pimburattewa reservoir spills. The area within the dikes remains submerged during those periods and is used by farmers for buffalo grazing during other times. The planting program for this section should be designed in such a way that water flow in the rainy season is not impeded and farmers do not lose their grazing grounds. Figure 3 depicts a diagrammatic model for planting in this area. The following major zones in the CHS have to be treated separately.

4.1.2. Grazing area (A zone)

The area between the inner toes of the dikes should be left in grass for grazing. No planting should be done in this area.

4.1.3. Bank stabilization and flood control area (B Zone)

In the B zone a double row of bank stabilizing species can be planted at intervals of 2 m X 2 m alternatively. The following species are recommended for this purpose.

1. *Bambusa vulgaris*, kaha una (S), yellow bamboo (E)
2. *Dendrocalamus strictus*, una (S)
3. *Pandanus thwaitesii*, wetake (S), screw pine (E)
4. *Saccharum arundinaceum*, rambuk (S)

4.1.4. Inner slope of the dike (C Zone)

The planting distance may be 5 m X 5 m. Trees should be planted in this area before the onset of Maha rains (before the stream begins to carry high volumes of discharge). The following are some of the species recommended.

1. *Terminalis arjuna*, kumbuk (S)
2. *Aglala roxburghiana*, puwangu (S)
3. *Madhuca longifolia*, mee (S)
4. *Polvalthia longifolia*, owila (S)
5. *Syzygium cumini*, ma dan (S)

It is expected that these trees will eventually restore the original riverain setting.

4.1.5. Dike area-(D Zone)

The trees in this area should be drought tolerant, medium size and shallow-rooted. A belt 4 m wide should be left out from tree planting on the summit of the dike to facilitate the movement of agricultural vehicles, people and animals. The planting distance

should be 4 m x 4 m. The following are some of the species recommended for this section.

1. Azadirachta indica, kohomba (S), neem (E)
2. Feronia acidissima, divul (S), wood apple (E)
3. Cassia fistula, ehela (S), Indian laburnum (E)
4. Dimocarpus longan, mora (S)
5. Siyambala (S) Tamarind (E)

4.1.6. Utilitarian (Gan goda) area (Zone E)

It is recommended to plant the area on the outer slope of the dikes with home garden plants that are widely used by the farmers in the Dry Zone. Already there are isolated patches of this type along the dikes. It is expected that these areas will eventually be developed into dry zone forest gardens. Some of the species recommended are,

1. Artocarpus heterophyllus, kos (S), jak (E)
2. Artocarpus altilis, del (E), bread fruit (E)
3. Mangifera indica, amba (S), mango (E)
4. Cocos nucifera, pol (S), coconut (E)
5. Areca catechu, puwak (S), areca nut (E)

4.1.7. Peripheral area (Zone F)

The area outside the dikes and the boundaries of paddy fields is limited in many places. In others, low-lying lands display wetland conditions particularly where the old meander channels still exist. In such situations it is not possible to establish home garden trees. However, economically important plants such as banana, Pandanus (wetake), Sedges (pan), Colocacia (ganala), Lassia (kohila), etc. may be introduced into these areas.

4.1.8. Establishment of fire barriers

It is necessary to protect the planted species from fire and vandalism. This may be partly achieved by planting fire resistant species in strategic locations. It may also be necessary to introduce thorny species into these areas to discourage trespassing. It is also useful to persuade farmers not to burn hay and if they do, to prevent it spreading into the tree planting zone.

4.1.9. Buffalo Entry Points

The grazing area should be accessible from various places. These entry points may not be obstructed. Existing inlets in through the dikes may be used for this purpose.

4.2. UNDEVELOPED SEGMENT (UDS)

In this area the stream banks (B zone) and the barren lands (C Zone) on either side have to be planted. The planting model recommended for this section (Figure 4) is similar to that of CHS, differing only in the absence of the E zone.

Prevention of fire is very important in this area. At the peripheral areas fire resistant species should be planted. Species with economic value such as Aloe can be used for this purpose.

Trees recommended for the C zone of this segment are drought tolerant, fast growing and shallow rooted species generally found in the dry zone of Sri Lanka. The B zone plants are same as those recommended for CHS.

Trees recommended for the B zone of UDS are given below.

1. Berrva cordifolia, halmilla (S), Trincomalee wood (E)
2. Cassia fistula, ehela(S)
3. Caloroxylon swietenia, burutha (S)
4. Dimocarpus longan, mora (S)
5. Feronia acidissima, divul (S)

4.3 NON CHANNELIZED SEGMENT (NCS)

Remnants of original riparian forest are present in some areas of this segment. However, much of this area is disturbed. In some places a 40 m wide belt on the right bank may be used for enrichment planting with trees recommended for the B and C Zones. On the left bank only the bank stabilizing plants may be planted due to lack of space resulting from the spread of paddy fields up to stream banks. Figure 5 gives a model for planting in this zone.

4.4. PROCUREMENT OF PLANTING MATERIALS

The contractor shall be responsible for supplying seeds and planting materials to the MEA/MARD nursery in a timely manner to insure that adequate planting materials are available according to the planting schedule. Because the first planting period occurs at the beginning of the rainy season in 1993, plant will have to utilize whatever planting material readily available at the time. The plants available in the MEA/MARD nursery are given in Appendix 1. When possible, seedlings should be allowed to grow to 50 cm before transplanting, so they will have a greater chance of survival. Saplings of dry zone climax forest species may be collected from dry zone riparian lands if that is desirable.

4.5. GROUND PREPARATION

On sites where a dry grass cover prevails it will be necessary to clear weed the ground where necessary by manual scraping. However, the medicinal plants already in the areas should not be removed.

4.6. GENERAL GUIDELINES FOR PLANTING

1. Planting should be done to maximize the species diversity.
2. Trees should not be planted in rows.

3. The planting hole should be 1.5 f X 1.5 ft X 1.5 ft. (= 0.5m)
4. Cow dung/compost should be added to the planting hole. (one basket per hole = 1 cubic foot)
5. A basal application of inorganic fertilizer is required. (30 grams per hole)
6. Tree guards or other protective means will be necessary at critical locations for protection of planted trees during the initial growth periods.
7. Farmers may be contracted to carry out planting in the CHS and NCS.
8. NGOs, school children and university students should be involved in planting in UDS.
9. Planting should be properly supervised.
10. All personnel involved in planting should be given adequate training under expert guidance.

4.7. TENDING OPERATIONS

1. Three major areas of tending are identified.
 - a. weeding and casualty replacement.
 - b. watering plants specially during the dry periods.
 - c. maintenance and protection.

To motivate farmers for protecting plants an incentive program should be implemented.

4.8. MONITORING

Growth and development of the forest must be monitored closely; this may be carried out by university students as part of projects.

4.9. FIRE PROTECTION

Apart from establishing fire resistant species like Agave and Aloe, fire lines should be created between the paddy fields/open ground and reforested area. Care should be taken to maintain fire lines throughout the year.

5.0. COMMUNITY PARTICIPATION

Community participation is essential for the success and sustainability of the reforestation project. It is expected that the sub-contractor will seek active community participation throughout the project. The offerer must provide the following plans.

5.1. A PLAN FOR BRINGING FARMERS AND THEIR ORGANIZATIONS INTO THE PLANNING PROCESS IN ORDER TO MAKE THE FARMERS FEEL THAT THE REFORESTATION PROJECT IS FOR THEIR BENEFIT

Meet with riparian farmers and their organizations along with MEA and MARD officials to conduct open discussions on the need for and the usefulness of the project and to ensure their participation in the choice of species, planting, maintenance and protection of the reforested area.

5.2. A PLAN FOR PARTICIPATION IN PERIODIC LOCAL MEETINGS WITH FARMER REPRESENTATIVES TO KEEP THEM UP TO DATE ON PROJECT PROGRESS AND TO SOLICIT THEIR VIEWS.

It is advisable to organize frequent formal meetings with the representatives of the riparian farmers and existing farmer organizations. This should be arranged by the Resident Manager and Community Liaison Officer.

5.3. DESCRIPTION OF HOW THE LOCAL COMMUNITY WILL MANAGE THE FOREST, ESPECIALLY THE PLANTS OF ECONOMIC VALUE.

Sub-contractor should facilitate the process of sharing benefits from the reforestation project among the local communities. MEA/MARD policy is that such products belong to the Farmer Organizations. Special consideration should be given, however, to riparian farmers who will bear the major burden of forest development adjacent to their lands.

5.4. DESCRIPTION OF HOW TO HANDLE THE PROBLEM OF FARMERS HAVING ENCROACHED ON STREAM RESERVATIONS

An initial survey should be conducted to compile a detailed map of all riparian lands indicating encroachments. Through educational programs and institutional means encroachments into the area may be discouraged. The encroached land may be planted with suitable species with the concurrence and cooperation of farmers.

5.5. A PLAN FOR DEVELOPING AND CARRYING OUT EDUCATIONAL AND TRAINING PROGRAMS MAY BE PROPOSED.

6.0 BASELINE SURVEYS AND LAND-USE MAPPING

One of the subcontractor's first tasks after the award of the contract will be the production of baseline maps of vegetation, land uses, and property boundaries in the project area.

7.0. MANAGEMENT PLAN

The offerer must provide a detailed management plan indicating the following. One to three page CVs should be provided for management staff and scientific staff.

1. Project Leader who will have overall responsibility for the project and communicate with COP of MARD.
- 2. The project should have a Resident Manager (RM) who will be responsible for all day-to-day operations.
3. A Community Liaison Officer (CLO) working with the farmers and their organizations.
4. Adequate personnel to accomplish the project objectives, including scientific staff.
5. Statement on how the University will manage the project and coordinate with MARD/MEA.
6. Detailed plan for project monitoring and evaluation.

8.0. WORK SCHEDULE

The offerer must provide a detailed time-chart indicating the planned activities of the project on a monthly basis for the entire project period.

9.0. BUDGET

The offerer must provide a detailed budget with necessary justifications including the following items.

1. Pre-project expenses
 - a. planning and modelling
2. Capital costs
 - a. planting materials
 - b. planting and maintenance
 - c. protection of trees
 - d. Field office
 - e. Office equipment and computers
 - f. Audio-visuals
 - g. other equipment
3. Recurrent costs
 - a. Office maintenance
 - b. Transport (vehicle hire)
 - c. Audio-visual production
 - d. Salaries and wages as listed in the manning schedule
 - e. Workshops and Seminars
 - f. communication (Telephone and fax)
4. Miscellaneous costs (including media and
 - a. media and publicity
 - b. University overheads
 - c. Contingencies

10. PERSONNEL SCHEDULE

Provide a detailed statement of man-power requirements as given below. Task assignments, remunerations of each person must be explained and justified. The offeror is advised to search for efficient means to manage the project, such as using university staff delegated part time responsibility for Kuda Oya Reforestation Project where possible.

1. Management Staff
 - a. Project leader 120 days
 - b. Deputy Leader 45 days
 - c. Resident Manager 23 months
 - d. Community Liaison Officer 12 months
 - e. Field supervisors 46 months

2. Scientific Staff
 - a. Reforestation Specialists 45 day
 - b. Botanist 30 day.
 - c. Forest Ecologist 15 days
 - d. Natural Landscape Architect 10 days
 - e. Social Scientist 20 days
 - f. Resource Economist 20 days
 - g. Land Surveyor 20 days

3. Support Staff (Offeror should provide durations required)
 - a. Secretary (field office) months
 - b. Secretary/accounts clerk (campus office) months
 - c. Data Entry Person months
 - d. Environmental Artists days
 - e. Research Assistants months
 - f. Laborers months
 - g. Part-time support staff months

11. Reports and Products - The subcontractor will provide the following to the MARD Chief of Party:

- o Four copies of quarterly progress reports in English
- o Reforestation of both stream banks of the designated sections of Kuda Oya, with 40% of seedling/saplings surviving one year after planting and 75% of these surviving 20 months after planting

- o Four community training courses
- o One workshop in February 1995 covering lessons learned
- o Two research reports on reforestation program

12. Period of Subcontract - This subcontract is effective upon consent of the USAID Contracting Officer, and all work and services required hereunder shall be completed by July 31, 1995.

Below are illustrative details of the subcontract for the information of the offerors:

Ceiling Price - The firm fixed price for the work to be performed herein is _____. The contract may not exceed this amount.

Termination - This subcontract may be terminated:

- o By DAI, whenever the Subcontractor shall default in performance of the subcontract in accordance with its terms and shall fail to cure the default within fifteen (15) days after written notice, unless a different cure period is specified in said notice.
- o By DAI, if DAI's contract with AID is terminated.
- o By DAI, if AID and the Mahaweli Authority of Sri Lanka request such termination for any reason, including convenience.

Any termination shall be effected by delivery of a Notice of Termination specifying the reason for termination, the extent to which performance of work is terminated and the date on which such termination becomes effective.

On the effective date of termination, the Subcontractor shall stop all work and transfer to DAI, as represented by the MARD Chief of Party, all work, completed or partially completed. The Subcontractor shall submit a claim, on the basis of information available, for the amount due by reason of the termination. Payment under this clause will be submitted to AID by DAI for approval.

Payment:

Upon an agreed upon payment schedule, the subcontractor shall submit an invoice upon completion of such and such deliverable (divide work into phases perhaps).

The DAI agrees to pay the Subcontractor within forty five days of receipt of invoice and acceptance of its details.

Notices - All notices called for by the terms of this subcontract shall be effective only at the time of receipt thereof and only when received by the parties to whom they are addressed at the following addresses:

The Purchaser, Development Alternatives, Inc.
MARD Project
DAI
Pimburattewa
Sri Lanka

The Subcontractor

All notices called for by the terms of the subcontract shall be in the form of hand delivered letters, registered letters, telegrams, cables, fax or telex, in the English language.

Disputes:

All disputes arising in connection with this subcontract shall be finally decided under the Rules of Conciliation and Arbitration of the International Chamber of Commerce in Washington, D.C., by one or more arbitrators appointed in accordance with the Rules.

12. SUMMARY OF PROPOSAL REQUIREMENTS

Offerer must include the following items in the proposal. Failure to address any required topic included here or in the points above may disqualify the proposal.

1. Detailed planting plans for the three river segments, including species to be used, where they will be procured, how they will be planted and by whom, where they will be planted.
2. Detailed maintenance plans, including fertilization, watering, protection from buffalo and other threats, etc. Offerer should include a detailed incentive plan to encourage farmers to maintain plantings. etc.
3. A plan for monitoring the growth of the new forest during the project period and beyond.
4. A detailed plan for bringing farmers and Farmer Organizations into the planning process and including them in the planting and maintenance of the forest.
5. A plan for working with farmers and Farmer Organizations on allocation of fruits, medicinal substances and other forest products among the farmers in the area. The primary assumption is that such products are the property and responsibility of the Farmer Organizations, but special consideration should also be given to riparian farmers who will bear most of the adverse impact of forest development at this site.
6. A concrete plan on how to handle the problem of existing encroachments on reserve land and how to discourage encroachments in the future.
7. Plans for developing and carrying out educational and training programs.
8. A specific plan for carrying out a preliminary baseline survey and mapping of current vegetation and land use in the project area. Such a study could involve university post-graduate students.
9. A detailed management plan as outlined under 7.0 above.

ANNEXURE - 1

LIST OF PLANT MATERIAL NEEDED

<u>Species</u>	<u>Amount needed</u>	<u>Likely to be available at the MEA Nursery</u>
01. Bambusa vulgaris (kaha una)	10,000	nil
02. Dendrocalamus strictus (gal una)	10,000	nil
03. Pandanus thwaitzii (Wetake)	5,000	nil
04. Diospyros malabarica (timbiri)	2,000	nil
05. Tamarindus indicus (siyambala)	2,000	2,000
06. Dimocarpus longan (mora)	2,000	nil
07. Ferononia limonia (divul)	2,000	2,000
08. Berrya cordifolin (halmilla)	2,000	2,000
09. Azadirchta indicus (neem)	2,000	2,000
10. Bauhinia racemosa (maila)	2,000	nil
11. Schleichera oleosa (kon)	2,000	nil
12. Syzgium cumini (madan)	2,000	nil
13. Nauclea orientalis		
14. Musa spp. (plantain)	5,000	nil
15. Terminalia arjuna (kumbuk)	2,000	2,000
16. Madhuca longifolia (mee)	2,000	2,000
17. Mangifera indica (mango)	2,000	2,000
18. Citrus limonium (lime)	2,000	2,000
19. Citrus sinensis (orange)	2,000	nil
20. Agave americana (jute)	20,000	nil
21. Karanda 2,000	nil	
22. Kumburu 20,000	nil	
23. Aloe vera (komarika)	20,000	nil
24. Cocos nucifera (coconut)	2,500	2,500

10. A detailed work schedule showing tasks and targets on a monthly basis.
11. A detailed budget and separate budget explanation in which offers justifies all budget items.
12. A detailed manning schedule, including job descriptions for each professional and management position and a general job description for each category of non-professional staff. Estimations of manning needs presented in the project description (page) should be used as guides. Divergence from these estimates is permissible but must be explained and justified.
13. A description of university facilities and capabilities that can be brought to this project.
14. A description of university experience in managing and carrying out interdisciplinary, problem-focus research and contracts.

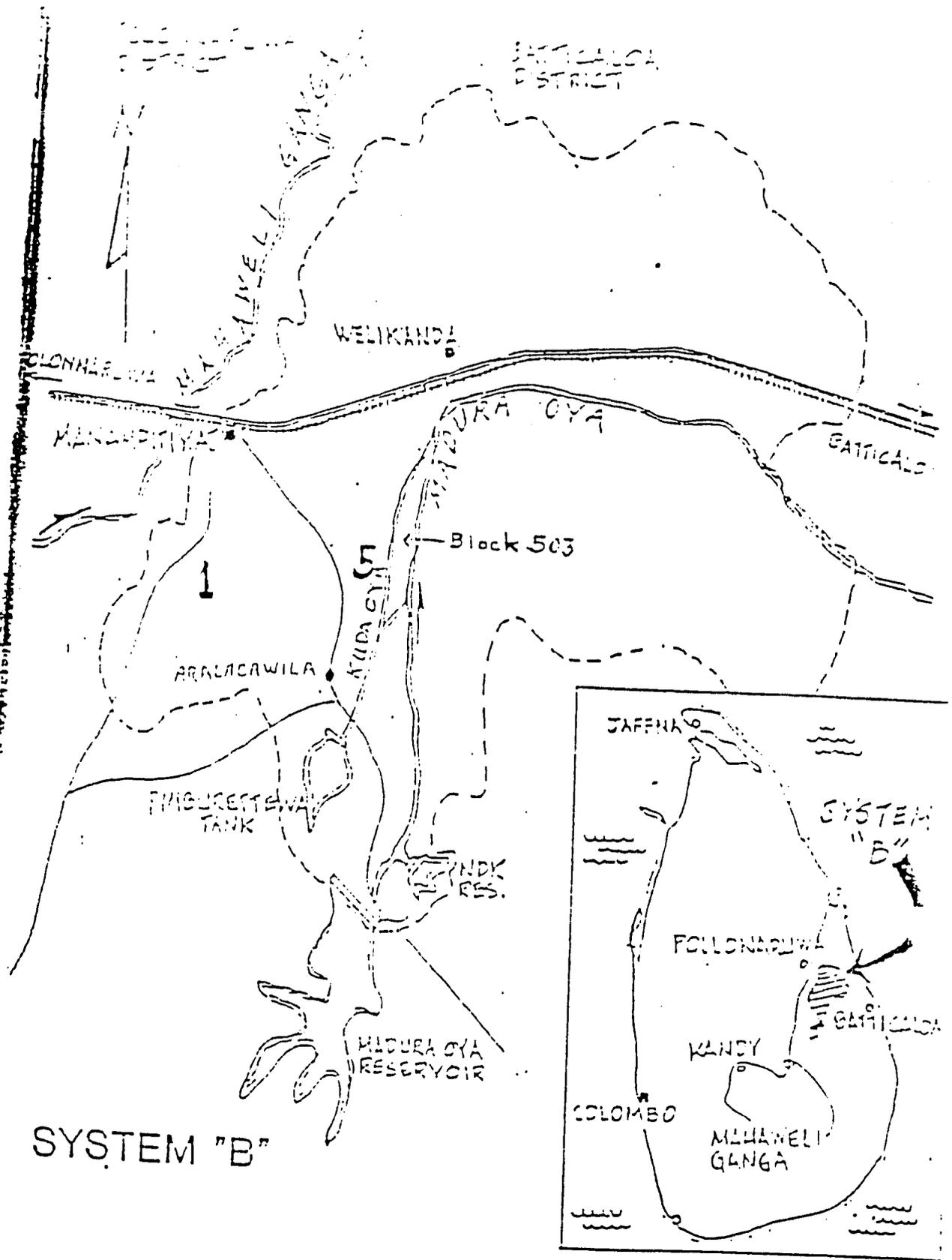
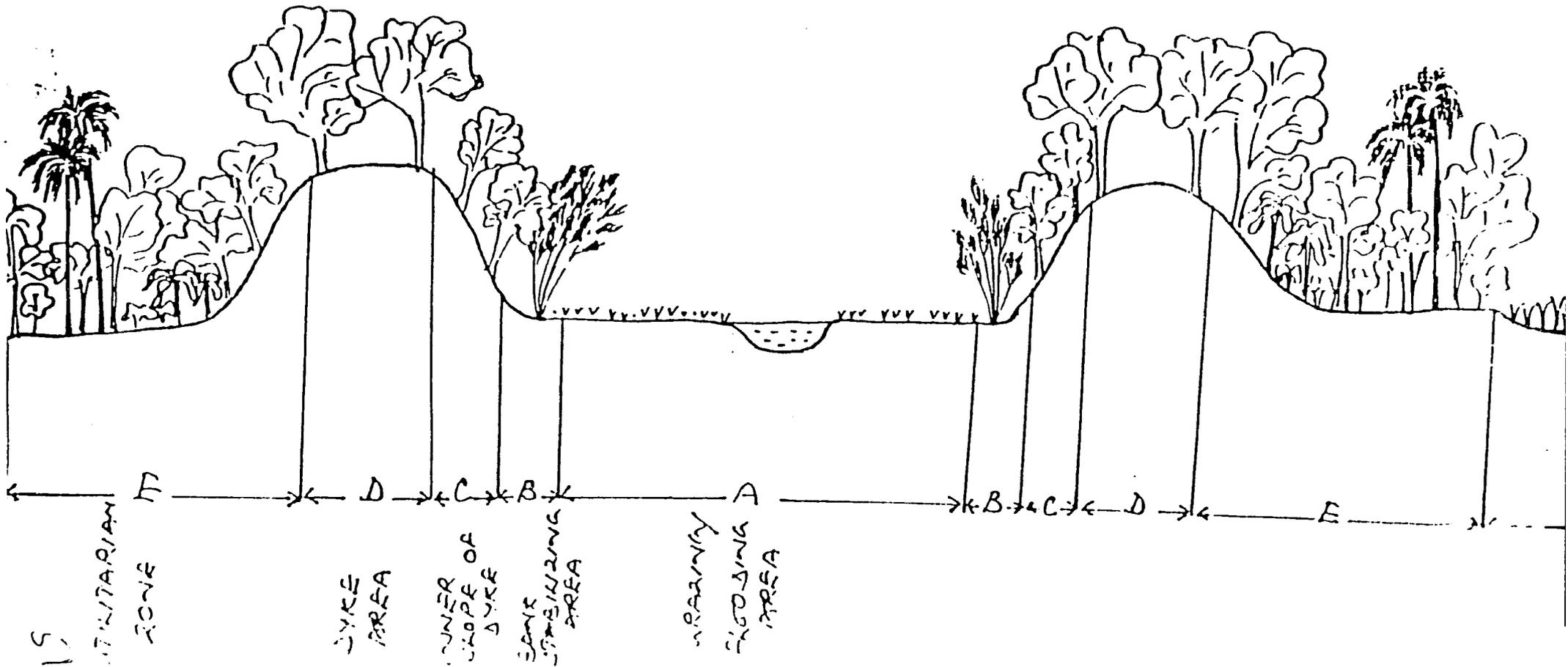


FIGURE 1

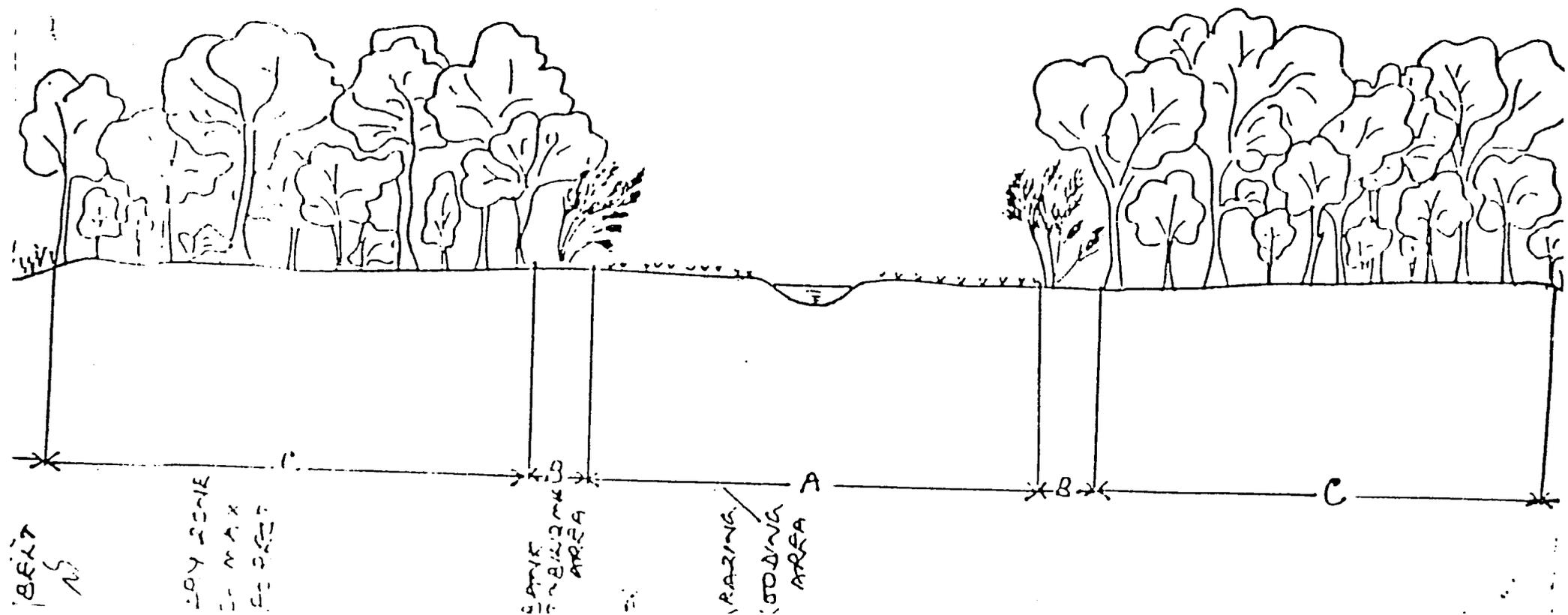
CHANNELIZED ZONE

Figure 3



NON-CHANNELIZED ZONE

Figure 4



ANNEXURE 3

**KUDA OYA RIPARIAN FORESTRY PROJECT (MEA/MARD):
REPORT OF A MID-TERM EVALUATION**

Members of the Evaluation Team :

Prof. C.M. Madduma Bandara (University of Peradeniya)
Dr. N. Kasturiarachchi (NGO Representative)
Mr. Karu Sooriarachchi (Journalist)

(Assisted by Mr. A. Abeykoon, Post-graduate Student)

Period of Evaluation:

11th to 13th March 1994.

Introduction

An interim evaluation of the Kuda Oya Riparian Forestry Project (KORFP) was undertaken in March 1994 by the above team at the request of MEA/MARD. The scope of this evaluation exercise was as follows:

- a. to carry out field investigations to ascertain the progress of the Project;
- b. to conduct a workshop with farmers and relevant MEA/MARD officials in-charge of the implementation of the Project;
- c. based on findings from a & b above, to prepare a report on the present status of the Project with particular reference to farmers' understanding of the project and their attitudes towards it.

The overall objective of the evaluation was to report on the present status of the Project and to propose mid-term corrections where necessary.

Survey Procedure and Methodology

The evaluation of the Project was to be carried out within a period of three days. Given this time constraint, the following methodology was adopted by the evaluation team:

1. Field visits to the Kuda Oya riparian area and to the MEA plant nursery.

2. Conduct a workshop with riparian farmers and officials involved with the Project.
3. Interview randomly selected riparian farmers to understand their attitudes and perceptions.
4. Collection of information from key informants who included both MEA/MARD officials and farmer leaders.
5. Reference to available office files and other documents related to the Project.

The approach had been primarily inter-disciplinary throughout the evaluation exercise. However particular attention was paid to farmer organizations and the sustainability of the Project. Every attempt has been made to listen to all sides of the story and to obtain the view points of all partners. Independence, openness and objectivity formed the underlying approach of the evaluation team. Members of the team were glad to note that, both farmer leaders as well as MEA/MARD officials saw them as a group of persons from whom they can expect an independent inquiry.

In assessing the progress of the Project, the achievement targets outlined in the initial TOR for the Project were taken as standards against which activities of the Project could be measured.

The KORFP as Initially Conceived

An Environmental Impact Assessment (EIA) of MARD 2, recommended the restoration of riparian forest along streams under the developmental purview of MARD. Subsequently, a wetland assessment of Block 503 and an overall environmental evaluation of the Accelerated Mahaweli Development Programme (AMDP), also referred to the need for rehabilitation of riparian lands.

Based on the above recommendations, a TOR was prepared for seeking offers from Sri Lankan Universities, for implementation of the programme. This TOR outlined the concept and the process of implementation of all facets of the Project including design, planting, monitoring and education of farmers. However, due to objections from an Assistant Conservator of Forests and Mahaweli Environmental Officer, implementation of the programme was not entrusted to a University. In the circumstances, MARD and MEA had to modify the plans and take over themselves the task of implementation of all aspects of the programme, in order not to lose the opportunity to establish the plants with the onset of the Maha rains. It must be mentioned that, this is a bold and ambitious decision to do something than nothing within the given climatic and bureaucratic constraints. Furthermore, it appeared that, much attempt has

been made by the MEA and MARD to base project activities as far as possible on the original concept and designs.

The original conceptualization of the project as outlined in the TOR which is used here as a standard against which the progress of the KORFP could be measured, is briefly given below.

"The Project would enhance natural bio-diversity in this largely agricultural landscape by restoring native riparian vegetation. The outer fringes of this forest areas to be planted with non-destructive products of value to local residents. However, the primary purpose of the new forest will be conservation rather than production".

The project was also expected to address a multitude of concerns which included ecological, utilitarian, engineering, environmental training, and sustainability concerns.

The initial strategy was to plant some 10km of riparian land on either side of the Kuda Oya immediately downstream of Pimburettewa Dam in Zone 5. Three stream segments within this 10km stretch, namely undeveloped (UDZ), channelized (CHZ) and non-channelized (NCZ) were identified for which different planting strategies were recognized. In each segment, several parallel zones along the stream banks were identified for planting different tree species. For example in the channelized segment, some 6 zones from the grazing area (A Zone) between the dykes, to wetlands in the outer side of the dykes were identified. The establishment of fire barriers with species such as agave and aloe were recommended and guidelines for tending and monitoring were also given. The initial project concept also included a strong component of community participation, environmental education and research which prompted MARD to seek the involvement of Sri Lankan Universities.

Progress of the Project

Our observations on the progress and present status of the project are presented in relation to the planting programme, implications of recent floods, and the performance of the farmer organization.

Planting Programme:

In our field visits we could inspect more than half the planted area and the ways in which planting had been carried out. Although it was not possible to make a full count of the plants on ground, MARD Forest Officer confirmed that altogether around 18,000 plants have been planted. Cross-checking with the nursery, the farmers and the available documentation

indicates that this level of planting had been achieved.

It was interesting to note that, natural riparian tree species such as Kumbuk, Karanda and Halmilla had higher survival rates than others. However, some dry zone species such as Kohomba had poor survival rates. Our inquiries indicate that the choice of under-aged plants had been the main cause of high casualty rates. They were also often planted on the crest of the dyke where soil moisture depletion rate was higher. This should have easily been avoided if proper advice was given in time. We have also seen many jute plants provided by the project have been abandoned in piles here and there. We learned that this is due to the lower planting rate paid for Jute. In most places where they were seen to be planted, they were not in the specific locations where fire protection was needed. We have also observed that certain exotic species such as casurinas were also planted by some farmers. In the original project proposal planting of such species had been deliberately avoided since they are alien to dry zone climatic climax communities. This indicates a lack of clear understanding of the project concept.

It was encouraging however, to note that, some farmers have made attempts to water the plants to save them, and to protect them from animals by fencing. This was particularly so in the case of economically useful species such as coconut and fruit trees. However, farmers have not thought of bringing plants from their own home gardens or from other places to establish them in their riparian lands indicating signs of total dependence. There had been no manuring by cow-dung or compost as anticipated. All this indicates that, farmers were not adequately motivated to conduct project activities with the sense of dedication.

Floods and their Impact

The wet weather experienced in most parts of the dry zone had been a blessing during the time of planting. However, the unusually heavy rains during December and January caused severe flooding in the Kuda Oya basin. Apart from heavy rains, some farmers believe that drainage waters from upstream Mahaweli areas into the Pimbrettewa tank had increased the spill waters from the tank aggravating the flooding of downstream areas.

The floods caused heavy damages to cause-ways, bridges and paddy fields adjacent to the flood plain. Many species of plants planted near the stream banks were washed away with the floods. The same happened to the fences erected to protect them. The damage was higher in places where planting was carried out on the flood plain beyond the inner toe of the dyke in variance with the original planting design. However, it was interesting to note how some of the dry zone riparian species such as kumbuk withstood the challenge of floods. Flood waters from the Aralaganwila spillway have also damaged the cultivation of nearly 30 acres belonging to some 12 farmers, many of whom were riparian farmers.

Although floods are a common occurrence in the Kuda Oya, the magnitude of the floods experienced in January 1994 were far beyond the expectations of many farmers and officials. The damage was most visible on cause-ways which cut off vehicular transport to some

areas. Some farmer leaders claimed that, they anticipated the collapse of some cause ways and alerted the engineers well in advance. While floods have caused much havoc, they also served to open the eyes of both engineers and farmers to the need for flood plain planning and riparian forestry. Even the most skeptic person now realize the importance of riparian forestry. At the same time it must be observed that, riparian forestry alone, cannot prevent flood damages in the future. Some technical solutions are needed to protect the bridges and cause ways. The cause way structures can perhaps be improved to serve several functions, by converting them to drop structures that reduce the velocity of flood flows, and to bridges that would enable all weather transport.

Social Organization and Leadership

As planned originally, the Project has successfully nurtured the establishment of a riparian farmers organization which was named by farmers as 'Kuda Oya Parisara Sanvidhanaya'(KOPS). The membership of the organization is open to all riparian farmers numbering around 74, in the selected area. Of this total, some 57 have joined the KOPS by the time of our visit. It has developed its own constitution and registered as an environmental NGO under the Mahaweli Authority. Its Committee has representation of farmers from all relevant tracks of the settlement and leaders of the Farmer Organizations established under the Agrarian Services Act.

The President of the KOPS is a farmer with a strong personality (Jayasiri Bandara) who is also heading a few other village level organizations. He is certainly an upcoming village leader may be with a political future. In fact, for an outsider, Jayasiri appears to be wielding a little 'too much leadership'. He seem to be rather outspoken and not so submissive to the officials, irrespective of their rank or seniority. However, from the farmers' perspective, these are qualities that should characterize a leader. It is only that sort of dominant personality which can ensure safeguarding their interests. At the group discussions held in connection with the workshop, a few farmers seem to have been somewhat ignorant of the activities of the KOPS indicating that information flow between the Committee and the ordinary members is weak. However the President has enrolled some of the young, more educated and dynamic members of the community to work with him in the Committee.

We found that the KOPS was functioning well without any serious problems. In particular, we made some attempt to find whether there is any financial mis-management by the Committee or the President. We have not seen or heard anything of that sort to the best of our knowledge. There were no serious charges against the President by any individual farmer. We learned that, there is over Rs.18,000/= to the credit of the KOPS. In view of the smooth development of the KOPS within a short period of time, we believe that it can take even more responsibility. It would however, be advisable to monitor closely the accounts of the KOPS periodically without infringing on the democratic rights of the society.

We had the occasion to observe, though in a limited way, the relationship of the KOPS with MEA and MARD officials. The relationship of the farmer leaders and MARD officials was cordial and hardly any criticism against each other had been heard. However, it was evident that relations between the KOPS President Mr. Jayasiri and Mr. Chandrabose of the MEA were not all that close and cordial. There is a misunderstanding among the farmer leaders that Mr. Chandrabose is not issuing the best plants to them from the nursery and that payments get delayed because of him. Mr. Chandrabose on the other hand maintains that the farmer leader was often asked to choose the plants at the nursery before they were taken away. However, he says that there were occasions when he had to give priority to political demands than to those of the farmers. It must be stressed that there is no serious conflict between the two parties as yet. However, as one official casually observed, Mr. Chandrabose is having a 'work-to-rule' policy. From what we could see and hear, Mr. Chandrabose is undoubtedly a conscientious officer. His attitude to farmers is however that, they are doing all this because of money and one has to be cautious in dealing with them. The farmers as a poverty stricken group undoubtedly gets attracted to any source that brings them some income. However, this attitudinal difference has potential for further conflict. This kind of 'cold war' could have been avoided, if a Community Liaison Officer as envisaged in the original proposal was appointed in time.

In conclusion, it may be stated that, if the progress of the programme is viewed against the original expectations of the KORFP, the current implementation effort is only an adhoc arrangement, hurriedly implemented by a few MEA/MARD officials who had the courage to undertake such a heavy and involved task. If they did not undertake the present activities nothing would have happened during the last rainy season and another well thought out proposal could have got disappeared in the portals of bureaucracy. The officials who undertook this task, have done a commendable job within the given constraints, particularly in organizing a farmer organization as envisaged in the original proposal. However, as it is now, it appears that almost the entire burden of the KORFP is carried on the back of one individual namely, Mr. Mahinda Panapitiya of the MARD staff. Others who share this burden though in a limited way are Mr. Jayasiri Bandara (KOPS) Mr. Chandrabose (MEA) and Mr. Narampanawa (MARD). This raises some doubts about the sustainability of the entire project. As we see it, the only way in which this can be assured is to strengthen the KOPS so that they can carry the entire burden in the future. This however, cannot be easily achieved without a proper farmer education programme and a continued interest in the project in terms of its educational and research value.

Some Recommendations

In considering both immediate needs and the long-term needs for sustainability, the following recommendations could be made.

Immediate Needs:

Action has to be taken immediately to protect the surviving plants from buffalo

and fire damage. Soon after the Maha harvest the buffaloes will be let free to graze in the paddy fields and adjoining areas. It is most likely that they will concentrate along the riparian areas and damage the newly established plants. In our interviews, farmers have asked for a limited supply of barbed wire from the project, so that they can bear the rest of the cost of fencing. We suggest that farmers be supplied with at least two lines of barbed wire to protect their lots.

After the harvest, many non-riparian farmers may burn the hay in their threshing floors unless some preventive action is taken. These fires are likely to spread into the riparian lands and may destroy the newly established plants. This problem can be handled in two ways; —(a) by persuading farmers to refrain from starting fire in their fields, and (b) establishing fire barrier- belts as suggested in the original proposal.

With the onset of the dry spells and the long dry season, it is likely that most plants, particularly those on the dykes may face a severe moisture stress. The recommended plant species for such locations may withstand the drought once they are fully established. However, until then periodic watering may greatly enhance their chances of survival. For this purpose, it would be best if a few mobile water pumps are provided to the KOPS. The use of these pumps should however, be closely supervised.

Other Recommendations:

In order to strengthen the KOPS to ensure the sustainability of the project the following suggestions are made.

- * Provide some land at Arunapura, near the School and the Temple, for the KOPS to start its own nursery and office. This should be a joint venture between the School and the KOPS.

- * Transfer all the major project activities in stages to the KOPS with necessary financial safeguards. This should be made under agreement with provision for auditing and supervision by MEA/MARD.

- * The University may be involved in education, training and research and for development of the project concept.

- * Establish a farmers' children group to promote awareness programmes and to operate in coordination with KOPS and the School.

- * Arrange a competition among riparian farmers and award prizes and incentives for the best lots to encourage better planting, maintenance and protection.

* A team of engineers may be deployed to study the problem of floods and to examine the need for technical improvement of causeways and bridges.

* A Community Liaison Officer may be appointed to link MEA/MARD activities with the KOPS.

T. M. Anand *MS*

Peradeniya,
15th April 1994

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ANNEXURE 4

TABLE I

KUDA-OYA RIPARIAN FORESTRY PROGRAM
FOREST TREES PLANTED

S/No.	Name of the farmer	No. of trees	No. of Survived plants*
1	M.D.Weerasinghe	358	260
2	R.B.Sudubanda	292	61
3	J.A.Somarathne	371	158
4	J.H.Karunaratna	390	102
5	Y.P.Puncha	144	72
6	R.P.Kuvintus	219	125
7	R.P.Kithsiri Ananda	432	160
8	H.T.Karunawathi	197	73
9	E.M.P.Ranatunga Banda	277	35
10	G.G.Nandasena	314	40
11	K.G.Wijedasa	428	178
12	G.D.Somawathi	462	316
13	H.A.Somalatha	165	53
14	R.W.Danasiri	486	110
15	R.G.Ginadasa	521	59
16	G.M.J.Bandara	602	520
17	L.D.Danapala	178	67
18	M.G.Somidu	467	116
19	W.A.Sirisena	517	415
20	T.H.M.Bandara Manike	375	89
21	P.W.Sugathapala	56	56
22	K.K.Daglus	295	102
23	P.K.Somadasa	151	82
24	J.A.Symonsingho	220	193
25	K.A.Magrathna	146	19
26	K.D.Samarasinghe	188	73
27	M.G.Thilakarathne	274	98
28	S.M.Mudiyanse	75	35
29	L.B.Kulatunga	584	357
30	G.G.Somadasa	360	57
31	M.G.Jayantha Wilson	50	42

* = Surveyed on April 1995.
Utility trees are not included.

TABLE 2

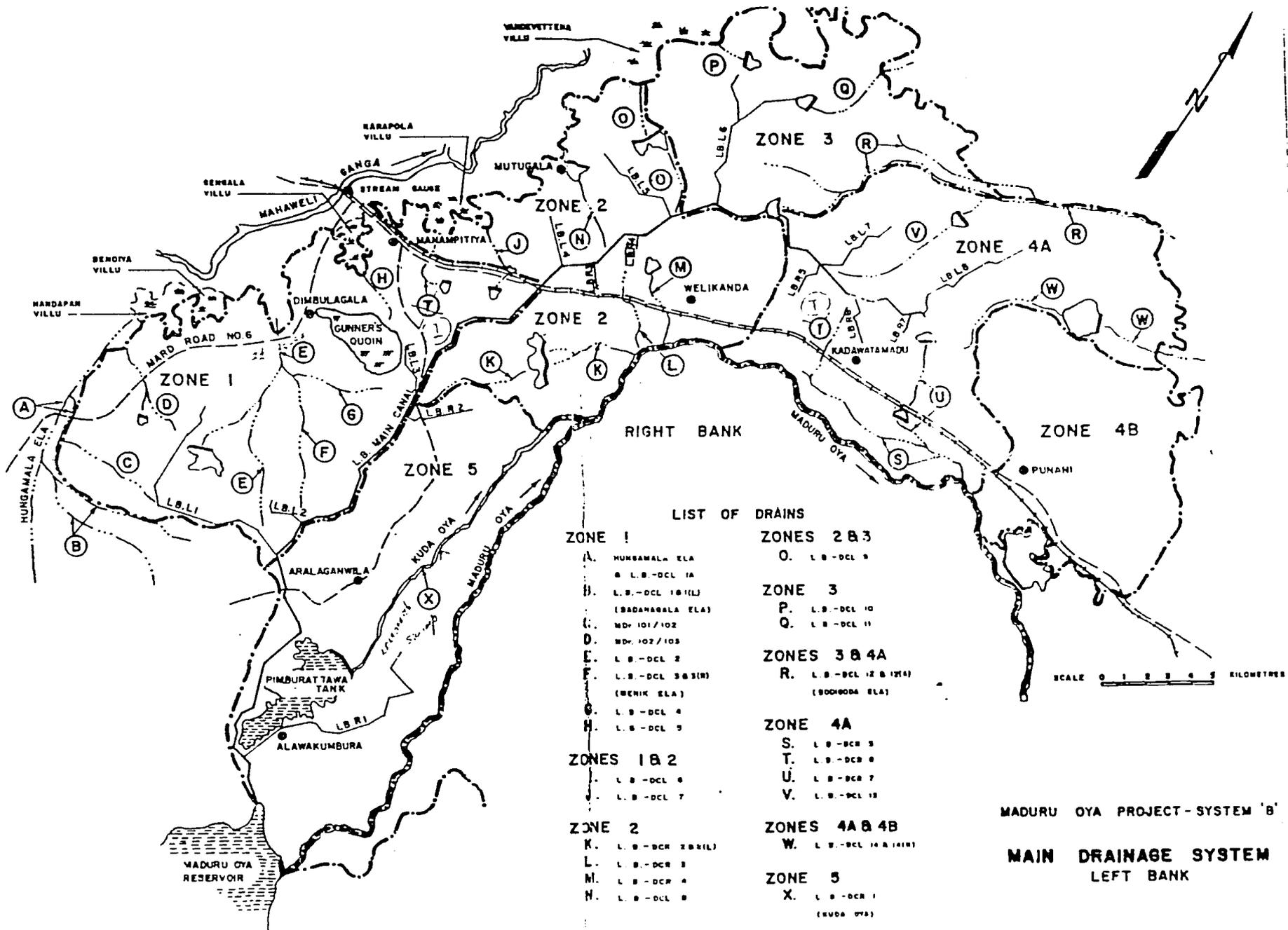
MANIK ELA – BAMBOO PLANTING PROGRAM

FOs participated	No. trees planned to be planted	Actual No. of trees planted
1. Kudaoya Environmental Organization	5000	2000
2. Bimpokuna Farmer Organization	10000	10000
3. Mahaulpotha Farmer Organization	2750	3750
4. Singhewewa Farmer Organization	7000	0
5. Pahala Ellewewa Farmer Organization	8000	0
6. Kalukele Farmer Organization	3000	661
7. Bogaswewa Farmer Organization	5000	7710
Total	40750	24121

TABLE 3**Main Natural Drains in Zone 1 & 5 – Estimation for Riparian Forestry**

Name (Refer the map)	Length	Area (Ha)
LB-DCL 1A (Hungamala Ela)	31.0	248.0
LB-DCL 1 (Sandhanagala Ela)	15.0	120.0
MDr 101/102	4.3	17.2
MDr 102/103	5.5	22.0
LB-DCL 2 (Menike Ela main stream)	12.4	99.2
LB-DCL 3 & 3(R)	8.1	32.4
LB-DCL 4	6.6	26.4
LB-DCL 5	3.1	12.5
LB-DCL 6	3.1	12.4
LB-DCL 7	2.0	8.0
LB DCR-1 (Kuda Oya)	16.0	128.0
Total Estimated Length =	107.1	726.1

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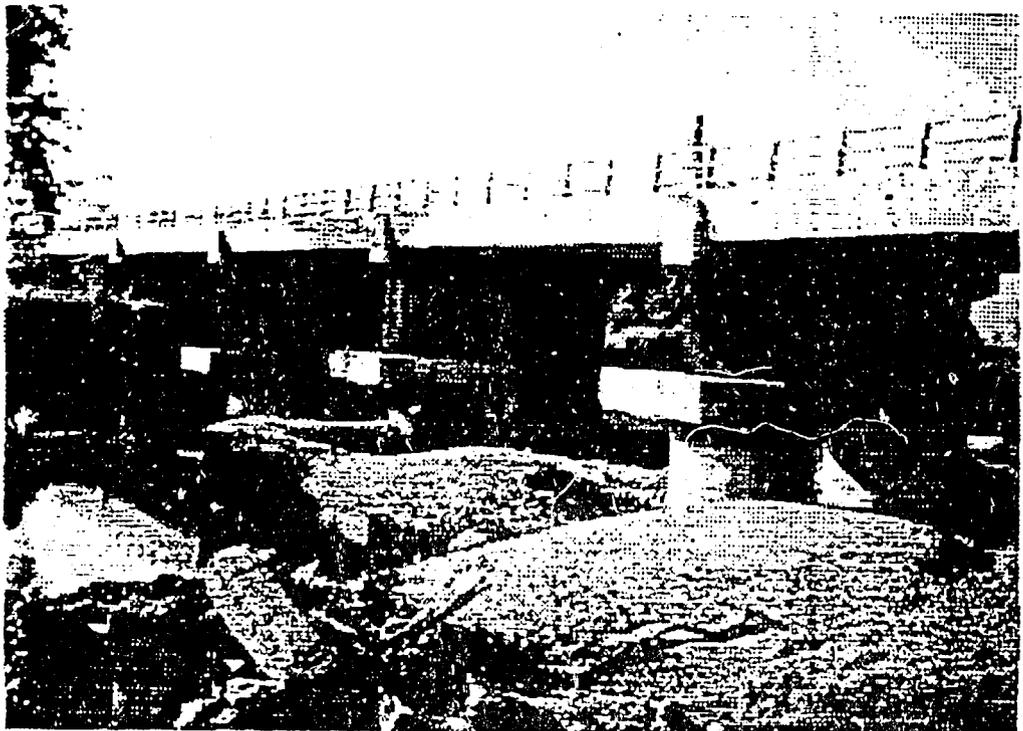


FIG. 1 - PHOTO TAKEN NEAR PIMBURATTAWA BRIDGE SHOWING EROSION OF STREAM BEDS



FIG. 2 - PHOTO ILLUSTRATING EROSION OF STREAM BANKS IN SYSTEM B