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**CONSTRUCTION
FINAL REPORT**

by

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**MARD PROJECT
PIMBURETTEWA**

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CONSTRUCTION

Introduction

The primary objective of the construction component of MARD Project was :

- (a) the expansion of irrigation and drainage infrastructure in Block 503 of System B and
- (b) essential structural improvement (ESI) in Zones 1 and 5 of System B (see annexed layout plan). The implementing agency was MECA for Block 503 development and MEA for ESI works.

Prior to construction activities, an environmental assessment was carried out by STTA Mr. James Tolisano in March 1992 who recommended measures and procedures to ensure environmental soundness of the project. His main recommendations with regard to construction were :

- o Protection and restoration of wetlands to serve as important waste water filters for farm and homestead runoff, and as habitat for aquatic species and other wildlife.
- o Conservation or restoration of stream side vegetation.
- o Flood control measures to withstand a 100 year storm event.
- o Landscaping and restoration of borrow areas after exploitation.

This assessment was later followed by an in-depth study of wetlands in Zones 1 and 5 by Dr. Craig Davis in August 1992. In particular, existing wetlands in Block 503 were identified and mapped. Drainage improvement and final layout plan of Block 503 were designed to conserve these resources.

Development of Block 503

Block 503 is bounded on the west by Kuda Oya and on the east by Maduru Oya. Naran Ela forms the southern boundary. Blockages along the Kuda Oya and Naran Ela, both natural and man made, retarded flood flow from the upper catchment, including spill water from Pimburattewa Wewa. About 200 ha of irrigable lands in Block 502 were subject to flood damages annually during Maha. In addition, about 400 ha of irrigable lands on the left bank of Kuda Oya in Blocks 505, 506 and 204 were similarly affected. Hence the urgency of this development. The block itself has a potential of 1000 ha of

irrigable lands, of which 700 ha have been blocked out, designed and estimated and of which 300 ha have already been provided with irrigation infrastructure, but settler selection has taken an unduly long time.

Drainage improvement was given foremost priority as it was necessary to reclaim the 1000 ha of land in Block 503 from water logging due to inadequate drainage. During the first year, Kuda Oya was cleared of obstructions, but Naran Ela took a year longer owing to unfavourable security situation from time to time. Altogether 27 kilometer of main drains were cleared to reclaim Block 503 in its entirety.

Topographic surveys showing 2' contours on 4 chains to an inch map was already available at the commencement of the project. Layout of canal systems and blocking out of farmlots were commenced from the inception of the project. The ground was generally of mild slope and in order to facilitate easy drainage, the down slope method of farm layout adopted in the MDS Project was found to be very appropriate. As the ground slopes did not exceed 1%, all farms were oriented in the direction of the predominant slope of the ground. The land use plan took cognizance of all recommendations to ensure environmental soundness. A minimum reservation of 40 m was ensured on the bank of Kuda Oya. The riparian forest in the reservation was retained as far as possible. Along Naran Ela a reservation of 20 m was allowed on each bank. Wetlands as identified by soil survey were preserved. As a general rule a minimum area of one percent of the area drained was set aside as wetlands strategically located to intercept and purify outflow water.

The layout of distribution system was prepared after allowing for the foregoing environmental requirements. Initially, distributory canal traces were set out and borrow areas were identified. A realistic estimate was prepared on the basis of haulage distance of suitable construction materials from borrow area locations. Field canal estimates were based on a pro-rata basis from the weighted average cost of completed canals elsewhere in System B.

Irrigation and drainage infrastructure to bring under cultivation 350 hectares of land was approved by USAID for reimbursement according to FAK procedures by PIL Nos. 51, 55 and 56 amounting to a total value of Rs. 45,057,903. Meanwhile construction of causeway across Kuda Oya, culverts and temporary access roads were put in hand and tenders invited for construction of various sub projects.

Once unhindered access was established, construction work on tertiary irrigation system and clearing of main drains commenced simultaneously. 7.27 km of distributory canals, about 30 km of field canals and completion of initial clearing of 16.5 km of Kuda Oya, 11 km of Naran Ela and staking out of 350 farmlots, was the target for year one (1993).

This target could not be met owing to the sporadic incidence of terrorist attacks and setting in of early Maha rains. For over six months there was no construction activity in Block 503 during Maha 1993/94. In the meantime design and estimate for another 350 ha was completed and the work plan for 1994 targeted completion of a total extent of 700 ha by Maha 1994. Despite all the meticulous planning, irrigation development suffered several set backs. The main contracting firm who did the bulk of construction work wound up on the untimely death of its Managing Director in late 1994. MECA was compelled to complete some of the works with their machinery and awarding construction works to contractors with limited equipment at their disposal. This being so, field canal construction and a few kilometers of distributory canals could not be completed by Maha 1994. Judging from the weak construction potential available in Block 503, it was decided to roll forward the total development targeted for Maha 1995 without adding any more to it even though 1000 hectares have been reclaimed for development. At the time of PACD, irrigation infrastructure for 300 farmlots are complete. These farms are scheduled to receive irrigation water during Maha 1995/96. Farmlots are being staked out, farmers are selected and turnout boundary drains are being excavated.

Timely completion of planned main drainage improvements just before Maha 1994/95 rains made it possible to evacuate floods expeditiously and hence reclaim the whole of Block 503 for irrigation development. There was divided opinion at the beginning of the project that this block is a flood plain and that it cannot be economically reclaimed. Ultimately all doubts were dispelled. Blocks 502 and 503 are totally free of any more flooding. Similarly irrigable lands on the left bank of Kuda Oya, down to Galtalawa benefitted from the improvements. The first five km of Kuda Oya from its confluence with Maduru Oya remains to be improved. Design and estimates were ready but the work needs to be completed early to save over 200 ha in Block 204 from regular flood damage.

With regard to funding for development of Block 503, in addition to the Rs. 45,057,903 earmarked and committed for reimbursement by USAID, a sum of Rs. 60 million was released by USAID from PL 480 funds through consolidated fund of GSL for providing irrigation and drainage infrastructure for 700 hectares. This money appears to have not been received by MECA. Other factors contributing to slow progress were :-

- o Lack of competent construction contractors willing to work in Block 503.
- o Poor security situation during 1994/95 when contractors were requested to move out of their work places to safer areas in the night when military escort is withdrawn.
- o Time lag in tender procedure, evaluation and award of construction contracts.

- o Award of contracts without taking into consideration the current commitments of the contractor. A contract was awarded last year but the contractor has not commenced work as he has prior commitments elsewhere to complete.

At the time of project closure about Rs. 10 million is be deobligated from the grant component of the project financial plan as some field canals and sub distributory canal are incomplete.

The following works remain to be completed in Block 503:-

- o 400 hectares for which design, estimate and contract packages were ready in early 1994. Contracts were awarded for part of the works, but the contractor has not mobilized for several months.
- o Another 300 hectares for which layout plans and preliminary blocking out plans are complete, but final designs, estimate and contract packaging are not ready. This will complete the originally envisaged target of 1000 hectares.
- o Setters brought in and irrigable allotments handed over.
- o turnout boundary drains constructed for the 300 farmlots which are expected to receive irrigation water during Maha 1995.

Essential Structural Improvements (ESI) in Zones 1 and 5

The total irrigated extent in zones 1 and 5 is 9350 hectares which includes 1800 hectares of irrigable lands under the old Pimburattewa scheme, but excluding Block 503. These lands were developed for rice cultivation and therefore little heed was paid to drainage improvement. Almost 1200 hectares were affected by flooding. The field canals in these flood prone areas were mostly washed away and farmers resorted to field to field irrigation or obtained irrigation water by constructing stick dams across natural drains thereby worsening the impact of floods on farmlands. Rotational water issue could not be practiced in these turnouts. Owing to high water table build up, crop diversification was not possible. There were frequent crop failures or low yield of paddy . Therefore this category of work was given first priority.

Improvement of structures or additional earthwork in canals was given second priority. There were large number of canals requiring a roadway along the canal and structures to facilitate equitable distribution of water. Several farmlots were found unsuitable for crop diversification as timely application of water of requisite amount could not be assured as there were no control structures along the canal. Another

deficiency observed was lack of crossings to farmlots. Very often tractors were allowed to get across the canal without a crossing constructed, resulting in the canal bund being breached. This breach later got patched up but this was not so effective as to arrest seepage or leakage. In many instances pipe crossings were constructed which reduced the cross sectional area of flow without any downstream drop. This resulted in upstream heading up, bunds getting overtopped and breached while tail-end farmers suffered water shortage. There were also structures, in particular precast drops, which had collapsed due to defect in design.

Third priority items were the construction of new and improvement to existing roads, bridges and culverts. These structures were very vital in providing access to farms and markets from hamlets.

The implementation of the foregoing improvements was carried out with the active participation of farmer representatives. Fifty million rupees were earmarked for ESI works during life of project. Before commencement of work on the first category, it was necessary to improve the main drainage of the flood prone areas. Quite apart from the main drainage improvements carried out under development of Block 503, the following additional main drains were improved :-

Manik Ela	-	9.5 km
Naran Ela in Block 502	-	8.32 km

In addition, a dike was constructed on the left bank of Maduru Oya in Block 502 across a saddle to prevent high floods from Maduru Oya entering and damaging Arunapura block and areas downstream of it. A sum of Rs. 13.6 was spent on these drainage works and dike over and above the allocation for ESI works. About 300 hectares were saved from annual flood damage as a result of improvement on Manik Ela.

All ESI works were jointly identified by the Block IE and farmer representatives and thereafter designed and estimated by the engineering staff of the respective block offices. Works were then divided equitably by the DRPM (Eng) and offered to distributory canal organizations on contract for construction. Main drainage improvements and major concrete works were awarded to registered construction contractors.

On the whole, progress on ESI works was according to program and the benefits from the improvements were realized in the follow cultivation season. About 1000 ha of farmlots which hitherto were subject to severe flood damage indicated over 40% increase in yield during maha and 25% during yala. Improvements carried out under category 2 facilitated better water management which resulted in about 20% increase in paddy yield and the farms were more suited for crop diversification.

The following works were identified in consultation with farmer leaders, designed and estimated, but not constructed due to lack of funds :

- * Drainage improvement in Maligatanne (Block 502). Presently farmlots are subject to flooding.
- * Improvements to D6/502. This distributory canal has deteriorated due to back - water from Naran Ela before its outlet was opened out. Now it is ready for rehabilitation.
- * Extension of Ellawewa canal to command lands on the right bank of Punchi wewa. The left bank sluice of the latter is 16 ft below the right bank sluice. Hence during peak demands the lands commanded by the right bank sluice suffer water shortage when the tank water level drops below the minimum draw down level. Investigations reveal that these lands can be commanded by Ellawewa canal. This would enable Punchi Wewa to be drawn down to the left bank sluice level and have active storage for regulation.
- * Aralaganwila tank spill modification and tail channel improvement. This work will improve the drainage of waterlogged lands upstream of the tank and control floods downstream. About 30 hectares are presently affected.
- * Improvement of 8 km. of main drain in the upper reaches of Manik Ela. Presently about 150 hectares are affected by floods during the rainy season.

On the whole, ESI works were completed to schedule. The main contributory factor to this was the farmer participation in the entire process. This in turn enabled smooth "turnover" of completed canals in good working condition to distributory canal organizations for joint management of the irrigation infrastructure. In the ESI program farmer organizations availed the opportunity to gain technical and management skills. These newly acquired skills will stand them in good stead in the operation and maintenance of the tertiary system and in undertaking construction contracts on similar works in the future.

Review of operation and Maintenance

The main and branch canals are inspected annually by an external inspection team and recommendations made for operation and maintenance. This work has been initiated and coordinated by the TA team and the inspection reports have proved invaluable in planning the annual preventive maintenance program and updating procedures, policies and practices. As year-round irrigation is being practiced in order to grow market oriented crops, every effort must be made to avoid canal closure to effect breakdown maintenance. These inspections have drawn attention to conditions which, if neglected, would have resulted in failure of the canal and consequent disruption of service.

Reading through the previous three inspection reports, it is clear that the recommendations from external inspectors has been extremely valuable in prolonging the life of the canal network and minimizing recurrent O & M cost.

The latest inspection report of July 1995 has drawn attention to the following priority works among others :-

- o Anti-corrosive painting of exposed metallic parts of gates and hoists.
- o Clean and improve the side drains in cut sections.
- o In LBR1 the O & M road at the 5th km is in imminent danger of being washed away by floods entering from outside the cut section. Outside drainage must be lead away from the cut section and not into it as is presently happening. The remedial measures are simple, straight - forward and inexpensive.
- o Kadupokuna market road bridge across branch canal L6 has been built without taking precautionary measures to keep outside drainage from entering the cut section. The remedy is straight - forward as in the previous case, but very urgent to avert a breakdown. Already a section of the lining has failed.

In view of the benefits obtained so far, and in keeping with the O & M practices adopted in systems of similar magnitude elsewhere, continuation of annual inspections by external inspectors is strongly recommended.

Conclusion and Recommendation

A major achievement of the construction activity was the reclamation of 1000 hectares of potential irrigable land in Block 503, of which, 300 hectares are provided with irrigation and drainage facilities. Even though project target was development of 1000 hectares, the following factors stood in the way of progress :-

- o Owing to funding complexities and bureaucratic confusion, MECA has not been able to use USAID PL-480 funds reserved to it by the Treasury.
- o Poor security situation during 1994/95.
- o Undue delay in tender procedure and contract award.
- o Awarding contract without considering the contractor's current commitments elsewhere. This resulted in the contractor not being able to mobilize in time.

At the time of project closure, it is heartening to note that settlers will be brought in soon for the 300 farmlots. It is

hoped that the balance 700 hectares will be developed expeditiously. If and when this balance work is to be recommenced in earnest, the Resident Engineer's office must be located in proximity to the site in order to ensure constant supervision of work.

Clearing, aligning and widening of Kuda Oya over a distance of 5.2 km from its confluence with Maduru Oya is most crucial. Farms in Block 204 will continue to suffer flood damage unless the entire Kuda Oya is improved and dikes constructed on the left bank to prevent floods from entering the fields. Design and contract packages were ready during early 1994, but it needs drive and initiative to award the work and complete it in time.

With regard to ESI works and main drainage improvement, MEA has kept on schedule and made very satisfactory progress on both these programs. A few urgent works have been identified, designed and estimated but due to lack of funds work could not commence.

Excepting Hungamala Oya which forms a common boundary to Systems B and C and needs to be improved jointly, all other major drains in zones 1 and 5 have been improved or proposed for improvement once funds are made available. Over 1000 farmlots have been saved from recurrent flooding and all planned ESI works are well under way for completion by the end of 1995. The irrigation and drainage infrastructure of zones 1 and 5 are now in good working condition and the farmers have shown their appreciation in no uncertain terms at several meetings. It is now left to the farmers and MEA to properly maintain the infrastructure and ensure continued system performance.

