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Aide Memoire

Tamil Nadu Irrigated Agriculture Modernization and Water-bodies Restoration and Management Project (TN-IAMWARM) - Implementation Support Mission (Sept 20- Sept 28, 2010)

| Project Data | | Current Ratings and Flag | | |
|-------------------------------------|---------------------------|--------------------------------|-------------|-------------|
| <i>Board Approval Date</i> | <i>01/23/2007</i> | <i>Summary Ratings</i> | <i>Last</i> | <i>Now</i> |
| <i>Effectiveness Date</i> | <i>04/09/2007</i> | <i>Development Objectives</i> | <i>MS</i> | <i>MS</i> |
| <i>Closing Date</i> | <i>03/31/2013</i> | <i>Implementation Progress</i> | <i>MS</i> | <i>MS</i> |
| <i>MTR date- Actual</i> | <i>03/05/2010</i> | <i>Project flags</i> | <i>None</i> | <i>None</i> |
| <i>Original Loan Amount</i> | <i>US\$485 million</i> | | | |
| <i>Amount Disbursed¹</i> | <i>US\$161.93 million</i> | | | |

I- Introduction

1. A World Bank team² undertook an implementation support mission for the TN-IAMWARM project between September 20 and September 28, 2010. The objectives of the mission were to (a) review the implementation progress of various project components, and (b) review the plan for the utilization/reallocation of savings following agreements reached during the last mission (mid-term review February-March 2010). The mission would like to thank all Government of Tamil Nadu (GoTN) officers and staff of all implementing agencies and of the Multi-Disciplinary Project Unit (MDPU) for their hospitality, collaboration and for facilitating the field visits. The wrap-up meeting was held in Chennai on September 28, 2010, and was chaired by Principal Secretary PWD, Mr. S. Ramasundaram. A draft copy of the Aide memoire was discussed during the wrap-up meeting.

II- Project Ratings

2. The ratings for both achievement of the project development objective (PDO) and implementation progress (IP) remain marginally satisfactory. The PDO is to increase the productivity of irrigated agriculture in a sustainable water resources management framework. While the likelihood of achieving the PDO remains good, the lack of progress in putting in place the institutional modernization of irrigated agriculture (component C) and the water resource management framework (component D) increases the risks that achievement of the PDO could be compromised. Further, the project remains weak with respect to monitoring and evaluation. There is not currently a systematic way to address whether some key project outcome indicators concerning increase in farmers' incomes and increase in value of crop production per unit of irrigated water are being met. The IP rating is likewise tied to delays in implementation of components C and D, delays in implementing the M&E elements of the project design, as well as some delay as compared to the project implementation schedule in carrying out the irrigated infrastructure modernization work under component A. This Aide Memoire includes discussion of these issues as well as agreed follow up actions.

¹ See Section VI- Financial management & Disbursement for more details on disbursement figures.

² The Team consisted of Rabih Karaky (Team Leader), Joop Stoutjesdijk (Lead Irrigation Engineer), Anju Gaur (Water Resources Management Specialist), Edward Cook (Sr. Land Administration Specialist), Shankar Narayanan (Senior Social Development Specialist), Mohan Gopalakrishnan (Senior Financial Management Specialist), Dharendra Kumar (Senior Procurement Specialist), Anupam Joshi (Environmental Specialist), Ranu Sinha (Operations analyst), Sitaramachandra Machiraju (Agriculture Marketing Specialist), R.K. Malhotra (Construction Quality Specialist), Anil Borwankar (Construction Quality Specialist), Balwant Sathe (Livestock Specialist), Inder Abrol (Agricultural Specialist), and Jagdish Anand (IT specialist).

The Task Team will be in communication with the MDPU concerning progress on these issues and specific benchmarks for raising the PDO and IP indicators to satisfactory.

III- Implementation Status – Overview

3. The implementation of the irrigation infrastructure rehabilitation works (Component A) is proceeding well for phase I and phase II sub-basins. There is a concern that Phase III works might be further delayed and not likely to start until at least the beginning of the next calendar year due to (a) the time it took to finalize the bids and (b) the request by GoTN for price negotiations/retendering of 55 (out of 99) packages. *Subsequent to the mission, the Bank has issued a no objection to retendering of these packages.*

4. The implementation of the agricultural diversification and intensification activities (Component B) is proceeding well in phase I and phase II sub-basins, but with a lag for 4th year activities due to the delay in the issuance of the administrative sanctions. The mission learned that the administrative sanction for the various line departments was finally issued in August 2010, with the Government Order to be signed soon, and that the implementation of project activities in year 4 of the project and phase III sub-basins is just beginning. The mission is concerned of this recurrent problem and urges that GoTN addresses it to avoid implementation delays.

5. Overall, there is greater attention to quality of civil works implementation which is well appreciated by the mission. There are also reports of improved yields, particularly for SRI (reportedly up to 30%), maize (40%), fruits (30%) and vegetables crops (60%). There are also reports of early signs of improvement in the adoption of micro-irrigation systems, though this would need to be substantiated with reliable data.

6. Implementation progress under components C and D is likely to pick up once the agreed actions during the mission have been implemented, particularly the setting up of State Water Resources Management Agency (SWaRMA), the finalization of key project consultancies, and the recruitment of the Support Organizations (SOs) to build the capacity of the Water Users Associations (WUAs).

7. The mission is pleased to note that the independent Monitoring and Evaluation (M&E) team has mobilized, after some delay due to the replacement in its staff, and has begun the exercise of data collection and the development of the project management information system. The mission recommends full cooperation with the M&E consultant to accelerate the work and make up for time lost. The mission has learned that the project had advertised for the position of M&E officer at MDPU, as was recommended in the previous Aide memoire, but no good candidates have come forward. The mission recommends that the efforts to recruit a professional M&E officer at MDPU should continue until a suitable candidate is recruited.

IV- Key issues in Implementation

8. During the MTR review mission, a number of variations and new proposals were made to utilize/allocate project savings. These included (a) downsizing of Agriculture Engineering Department (AED) activities and reallocation of the savings generated; (b) dropping the Agribusiness Development Fund (ABDF) and reallocate it savings; (c) dropping the topographic and cadastral survey consultancy and reallocate its savings; (d) replacing a number of sub-basins while keeping the total target area of the project unchanged; and (d) rehabilitating and modernizing the Contour Canal which was expected to utilize the major part of all project savings.

9. During this visit, the mission has been informed by Principal Secretary, PWD that the GoTN would no longer be seeking project funds to finance the rehabilitation of the Contour Canal. The GoTN also

requested to retain the ABDF under the project and to reallocate part of its outlay to the agricultural marketing department.

10. As a result of these new changes, there would be significant savings under the project. It is important for the GoTN to decide as early as possible what it wants to do with these savings and inform the Bank accordingly. Options include developing well justified proposals for reallocation and utilization, or cancelling the funds from the loan amount. The mission requests the project to rework the table on savings under the various project components and to forward it to the Bank by October 31, 2010, *which has been done*. Should the GoTN decide to retain the funds, the mission requests that consolidated and well-justified proposals be prepared for this purpose and forwarded to the Bank for review by December 15, 2010.

11. **Alternative sub-basins** - GoTN has proposed to drop six sub-basins from the project and replace them with three sub-basins, bringing the total number of sub-basins under the project to 60, but with the total registered ayacut area under the project remaining unchanged (617 000 ha). The mission has no objection to this proposal provided that (a) the newly proposed sub-basins are not part of the Cauvery system, (b) the activities to be implemented in the newly proposed sub-basins by the various implementing agencies should be similar in nature to those of sub-basins where the project is already operating; (c) all line departments would be able to develop activities in the newly proposed sub-basins; and (d) activities in the new sub-basins are covered under the current Environmental & Social Management Framework (ESMF) of the project and no additional environmental/social safeguard policies would be triggered (e.g. natural habitats and forests). Upon confirmation in writing by GoTN that the above conditions are met, the project may go ahead and start preparing DPRs and forward them to the Bank for review/clearance³.

Component A: Irrigation Systems Modernization in a Sub-basin Framework

12. All 76 packages under Phase I sub-basins have been awarded, 67 have been completed, and 9 are under implementation. The physical overall completion rate is around 88% (68.4 percent last mission). It is reported that expenditures for phase I packages has reached around 402 crores up to August 31, 2010, against a total agreed value of about 450 crores which relates to a disbursement rate of about 89 percent (79 percent last mission). Region wise progress for phase I civil works on August 31, 2010 is about 66 percent in Chennai Region (40 % last mission), 96 percent in Pollachi Region (93%), 85 percent in Trichy Region (72%), and 92 percent in Madurai Region (83%). The mission commends the efforts of WRO engineers, and requests the Engineer –in- Chief (EIC) to identify the reasons for persisting deficiencies in the Chennai Region and address them.

13. There is good progress in the completion of Phase II packages. All 43 packages have been awarded, with 13 packages completed and 30 packages under implementation. Region wise progress for phase II civil works on August 31, 2010, is about 58% percent in Chennai Region, 60% percent in Trichy Region, and 80% percent in Madurai Region. The overall corresponding financial rate is reported to be around 67% (42 percent last mission).

14. The procurement plan for 99 packages under the 26 phase III sub-basins, with a value of about 273 crores, has been cleared by the Bank a while back. There has been some delay in the finalization of the bids, and in the commencement of the works in these sub-basins. Recently, the GoTN requested the Bank to allow price negotiations for 55 packages in Madurai Region, which the Bank was unable to accept. The monsoon season is also about to start which will hold things up further for at least another 3-4 months. The mission is concerned with the effects of this setback on the commencement and eventually completion of phase III packages and its implications on the realization of project benefits in phase III sub-basins and on disbursement. The mission learned that the GoTN intends to submit a request for retendering in light of the

³ This supersedes paragraph 18 in the Aide Memoire of the previous mission on the same subject.

Bank's decision not to grant a no objection for price negotiations. *Subsequent to the mission, GoTN has requested this retendering and the Bank has offered its no objection.*

15. *Construction Quality Control / Quality Assurance.* The mission made field visits⁴ to selected on-going and completed packages in Phase I and phase II sub-basins in Madurai, Chennai, and Trichy Regions, and also visited a package of Phase III work in progress in Madurai Region. It was satisfying to observe continued encouraging forward movement on the execution of rehabilitation works to acceptable workmanship and quality standards. The mission is pleased to see that, in some of the sites visited, the earlier grey area associated with compaction of earth fill in tank bunds is being addressed through deployment of vibratory power rollers and other soil compaction equipment. This commendable effort needs to be adopted across all packages though where tank bunds are being (were) raised to ensure that the earth fill on the slopes is adequately compacted. In some other sites visited the earthwork was not up to the mark with some erosion observed on tank bunds slopes following recent rainfall and/or bunds not cleared of roots and other overburden materials. In one of the sites visited by the mission, WRO engineers took immediate action to rectify the situation. Similar rectification should be done where needed within the defect liabilities period of the contracts. In some sites visited, villagers were complaining about the large number of trees in the tank bed. They were also demanding to deepen the reservoirs to store more water. In general, this is not recommended as the impervious cover will be lost and the amount of water lost could be higher than the additional water stored.

16. The internal quality management system has been appropriately strengthened and made functional through many result-oriented actions for promoting construction quality. These include: procurement of additional testing equipment for expeditious conducting of quality control tests in-house, induction of laboratory assistants & helpers in quality control divisions, providing on-job and hands – on training to field engineers on the testing procedures and quality control aspects, introduction and implementation of OK card system on all works for enforcement of technical specifications, and involving WUAs in construction quality through the OK card system with the cards printed in Tamil language. Some quality control aspects needing further fine-tuning have been explained to the engineers on site and are included in Annex I. Implementation of quality control / quality assurance requirements is a continuous process till the completion of works. WRO engineers should therefore continue vigorous monitoring of works to achieve the objective. In addition, *the proposed third-party construction quality supervision consultancy should be put in place the soonest for further strengthening of the quality management system.*

17. *WRO DPRs-Phase III and Phase IV.* The DPRs of the following Phase III sub-basins Nallavur, Gadilam, and Gomukhinadi were cleared by the Bank earlier. The mission urges WRO to finalize the procurement plan and forward it to the Bank for clearance, in order to tender the packages out as soon as possible. The mission also recommends that WRO finalizes the revision of the Kosathalaiyar sub-basin based on comments received and resubmits to the Bank. During the visit the mission undertook a technical review of some of the civil works component of 4 DPRs from the newly proposed sub-basins under Phase IV. Formal clearance would be provided after conditions mentioned in paragraph 11 above have been met and all other aspects of the DPRs have been received and reviewed.

18. *Canal Automation.* The team visited PAP canal system to understand the application of automation. It was found that majority of regulation systems are set for a season (135 days) and are operated on a fixed rotation with a target to supply the water to a field for 7 times in a season and during alternate years. The system runs substantially below the design capacity, and there is hardly any scope for the regulation of the main canal. The branch/distributaries also run continuously or on a fixed rotation for four zones with allocated discharge (50% below design discharge). It was not clear how often the gate openings are adjusted to stabilize

⁴ A Detailed report on all sites visited is included in Annex I.

the flow. The current operating system suggests that a stepwise approach for modernization of canal operation system may be adopted. At first the real time flow monitoring system may be implemented which would provide a platform for transparency (between the farmers and the engineers) in the system and also serve as a base to plan for the regulating structures to be automated. The automation should focus on improved operation and management practices up to field level with an aim to set as a pilot distributary for modern irrigation system. The mission recommends that a smaller distributary may be selected for the pilot automation exercise where the conditions described above are met, and where there is a need to regulate water distribution based on field conditions and competing uses for water by various users, which would justify the automation. The proposal for automation should reflect physical characteristics of the system, including hydrological and agricultural features.

Component B: Agriculture Intensification and Diversification

19. *Departments of Agriculture (DoA), Department of Horticulture (DoH), and Tamil Nadu Agriculture University (TNAU).* Amongst them, the three implementing agencies report 66,661 ha of demonstrations/expansion in area has been achieved to date (58,400 ha last mission) with more than 250,000 ha of impact area adopting promoted technologies.

20. It is reported that the percentage increase in paddy SRI in project demonstration plots, is 30-40% higher than the base/local average yield. In maize, the yield premium reached 50-60%; it is 35%-40% in Green Gram; 60% in Brinjal, 50% in Ladies Finger, and 30% in TC Banana.

21. Wide adoption of SRI technology for raising paddy (more than 70,000 ha) is clearly indicative of the benefits of technology. However, in the process of wider adoption farmers are facing new challenges which need to be addressed to achieve continued expansion of area under improved technologies. High labor requirements for transplanting and the need to modify and adapt “Cono” weeder for differing soil conditions are some of the cited constraints.

22. A significant highlight is the demonstration and wide adoption of farmers of growing green manure crop, *Sesbania Bispinosa* (dhaincha), grown for 40-45 days prior to rice transplanting. The practice is catching up due to several benefits that the farmers see particularly in reducing dependence on the purchase of costly chemical fertilizers.

23. Introduction of pulses (e.g. green gram) in rice fallows is yet another significant intervention. The crop requires little irrigation or other inputs and reportedly provides an additional income of Rs. 20-25000 per ha. Increases in maize productivity are particularly significant and farmers obtaining 7.0-7.5 tons per ha is a common feature in the project area. A combination of availability of hybrid/improved seeds and drip irrigation systems is bringing about market increases in expansion of area and income to the farmers growing onions, brinjals, ladies finger, gourds, etc.

24. Notwithstanding many achievements continued successes will call for attention to several emerging issues. Drip irrigation and fertigation are highly technical intervention. Their maintenance and operation will call for greatly strengthened training programs. Similarly adoption and profitability of drip systems will need to be viewed in a system-perspective considering the year round cropping systems. Drip irrigation Tissue Culture banana (TCB) was a success story but there were also indications that performance of tissue culture banana in some of the heavy soils might not be up to the mark. In the absence of scientific monitoring there is little opportunity to improve upon or refine technologies to suit specific situations. Thus the mission recommends that TNAU puts in place a strong adaptive research effort to address location-specific technology needs. Resource conditions (soils, climate, and water availability, cropping systems) vary greatly.

25. Drip irrigation is also being extensively promoted for plantation and fruit crops. The impression gained is that the system is being promoted with little consideration to intercrops, etc., which the farmers might follow in the initial years. There is also much to be desired by way of adequate attention in post planting (e.g. maintenance) phase of project activities. Department of Horticulture needs to step up its effort to ensure that these plantations are well maintained.

26. Practices like vermi-composting were being promoted as a part of INM strategy for some time. It was not obvious to what extent the technologies were replicated on their own. On the other hand, it was observed that farmers kept soils covered with crop residues (e.g. coconut plantations). Such practices are known to have multiple benefits by way of moisture conservation, improving soil fertility, organic matter, etc. DoA would do well to promote such practices as a way to achieve efficient resource use. Similarly growing crops like Sasbenia as a source of biomass for mulching might be an attractive way to conserve and efficiently use available water and nutrient resources while improving the soil quality.

27. Training of farmers on the new technologies being promoted needs to be strengthened. There is a great variety of resource endowments and growing conditions within and amongst the basins. Characterizing and understanding these typologies will be increasingly important to adapt and refine technologies to suit varying situations and to address location specific issues.

28. Some of the technologies being recommended and adapted are cost intensive. Cost effectiveness has to be a major driving paradigm in future efforts.

29. Both DoA and TNAU have suggested supplemental activities which they wish to pursue to make use of savings. Additional activities suggested by TNAU and which were conceptually agreed to during discussions include the following: a) demonstrations on conservation agriculture, b) sustainable sugarcane production, c) greenhouse gas emission methodologies and reduction, d) installation of touch screen equipment for agro advisories, e) statistical analysis of yield data for variability, and f) development of optimal cropping patterns at farm level. The details of these proposals will now need to be finalized for final clearance by the World Bank. Additional activities proposed by the DoA were discussed for finalizing the detailed DPRs. These include a) crop demonstrations in clusters (FFS model); b) seed village program to cover pulses, groundnut and green manure crop; c) vermin-compost units; and d) distribution of agricultural implements. Detailed proposals will now be required to give final clearance.

30. Regarding the proposal for assessment of methane reduction in SRI plots, it is suggested that a consultant may be contracted to provide technical guidance to develop a methodology that would be acceptable to the Clean Development Mechanism (CDM) Executive Board. TNAU should also start quantifying the environmental gains from the agricultural packages demonstrated in various sub-basins. *TNAU should clearly assess the adoption rate of demonstrated technologies, reduction in use of agrochemicals (fertilizers, pesticides, etc.), and savings in water (quantity) and convert these into enhanced productivity per drop as well as increased income per drop of water.* Such an assessment would be shared with the Bank by November 30, 2010.

31. It is reported that DoH has no savings and all funds committed would be utilized. The physical completion rate for DoH in phase I is reported at 90% (79% financial), and 66% (58% financial) for phase II sub-basins. No activities have been implemented so far in 2010-2011 due to the delay in the administrative sanction.

32. Given the significant upward revision in the subsidy norms for TCB under National Horticulture Mission (NHM), the mission discussed with the DoH the possibility to shift its focus under the project to other fruit crops and to vegetables where farmers' demand is reportedly significant. The DoH has repeatedly reported 100% achievement rate for TCB targeted areas under the existing (lower) subsidy pattern. There is no justification to increase the subsidy amount under the project. TCB activity may be undertaken exclusively

under the NHM given the higher subsidy offered there. Savings resulting from excluding TCB from phase III sub-basins would be suitably reallocated to other horticultural activities.

33. On the subject of TIPS, it was agreed that a total number of 50 TIPS would be retained by the DoH for the remaining lifetime of the project across all sub-basins.

34. *Department of Agricultural Engineering (AED)* – The activities assigned to AED include installation of 100,000 ha Micro Irrigation System (MIS), piped conveyance systems, and water harvesting structures such as farm ponds, all with the ultimate aim of improving irrigation efficiency. In addition, AED provides machinery to WUAs. During last mission, it was proposed to reduce the target for MIS from 100,000 ha to 40,000 ha due to slow progress while scope of other water efficient interventions such as piped water conveyance and water harvesting structures was increased to improve water delivery systems. During MTR, AED has been allocated INR 1622 million. Overall AED has been able to disburse only INR 187 million. A total of 7141 ha of MIS has been installed, while applications for 664 ha are under progress and 5900 more beneficiaries have been identified. A total of 1078 farm ponds have been constructed and 624 machineries have been distributed to WUAs .

35. In order to accelerate the adoption rate by farmers for MIS, several revisions were proposed in the approach accommodating for field situations and other schemes in the state. It has also been proposed to implement MIS using Government interim procedure in the areas where no bidding process is in place i.e. majority would be in phase III. AED is also coordinating with Primary Agricultural Cooperative Bank (PACs) who supports this activity through its own credit and extension system, as it has a target to provide credit of INR 1000 million for the year for MIS adoption. It is reported that this partnership is beginning to show good results.

36. The water harvesting structures are not progressing well and need comprehensive plan to implement them in appropriate manner. *It was recommended to engage a database manager* who would compile the existing information with the help of AED field staff. Based on the assessment of existing structures, the department can proceed with implementation. It was agreed that for this task, an expert will be engaged who would guide the AED team for effective implementation. *Therefore it is recommended that a Database management consultant and a water harvesting expert are hired by AED at the earliest.*

37. During past missions, it was agreed that a consultant would be engaged by AED to design pipe irrigation system and rectify already installed systems, and design a pilot gravity piped system in the PAP region. It is disappointing that AED hasn't engaged the consultant until now. On the other hand, it is good to see that AED has made tremendous efforts to design pipe system with sumps for two outlets in Veruedampalayam distributary. AED plans to implement the water management initiative "commutation water for water" in these two outlets (50 Ha) that would allow reallocation of water saving among each other. This would result in three times water use efficiency and substantial energy saving (63000 KWatt hr or Rs. 12000/ha per year) due to reduced loss on groundwater pumping.

38. The usage of farm machinery given to WUAs has not been very encouraging due to various reasons. The primary reason is no power (tractor) equipments available with the WUA that is required to operate the farm implements. AED should think of other mechanisms to implement this activity.

39. *Department of Agricultural Marketing.* Good work has been done by organizing marketing of 50,925 metric tons of agriculture commodities through the commodity groups and the infrastructure created under the project. It has been reported that 207 structures like Agri-Business Centers (ABC) drying yards, storage godowns, collection centers, pack house, etc. are fully operational. The remaining infrastructure works are at various stages of completion. The project has formed about 936 commodity groups mobilizing

farmers from the project areas and covering 18 commodities. These groups entered into 558 Memoranda of Understandings (MoU) that were signed with leading private agri-business companies for marketing agriculture produce.

40. During field visits the mission noted that there is demand for additional market infrastructure and value addition equipments, particularly drying yards, go downs, weighing scales, driers, and other small grading and value enhancing equipment. The mission recommends that the Department of Ag Marketing assesses the need for these items and prepares additional DPRs to be considered for funding. It was agreed that up to INR 50 million of additional financing would be made available for these activities, which would be reallocated from the ABDF savings. (reference to para 9)

41. The mission again recommends re-skilling and re-tooling of the staff of the office of Commissioner of Agricultural Marketing & Agri-Business on the aspects related to agri-marketing and private sector led agri-business models. At MTR, the project was advised to hire the services of a reputed management institute like Indian Institute of Management (IIM), Institute of Rural Management Anand (IRMA), National Institute of Applied Management (NIAM), or MANAGE, to develop and implement a tailor made program which would include exposure to (a) Agribusinesses models like ITC E-Choupal, DSCL Kisaan Hariyali Bazaars; (b) contract farming initiatives of Jain Irrigation, PepsiCo, Tata Chemicals/LT Overseas/PAFC; (c) Producer Companies set up by Madhya Pradesh District Poverty Reduction Project; and (d) MSP procurement through Commodity Procurement Centers by AP Rural Poverty Reduction Project. Visits to value chain coordination sites in agri-commodities and fresh fruits and vegetable sectors like ITC (Pune, Hyderabad), Metro Cash & Carry (Hyderabad), and Spencer's and Food Bazaars (Chennai). This is a high priority area and should not be delayed further.

42. *Agri-Business Development Facility.* The project requested the Bank to consider reviving the ABDF. The component was scheduled to be dropped at the request of Government of Tamil Nadu during MTR mission given the little progress. The mission cautioned that based on past experience there is a risk that the activity might not take off. The mission agreed to revive ABDF on a smaller scale. Progress will be reassessed at the next mission, and decision to expand or drop will be made accordingly.

43. The project proposed to set-up the ABDF at the state run industrial financial institution - Tamil Nadu Industrial Development Corporation (TIDCO). During the discussions with TIDCO, the mission gained the impression that the current and future business interests of TIDCO do not align with the objectives of the ABDF. Further, it came out clearly during the discussions with National Bank for Agriculture and Rural Development (NABARD) and International Finance Corporation (IFC) that there is enough liquidity in the formal financial sector and there are several existing schemes to support agri-business enterprises, and positioning ABDF as an investment window will have marginal impact. However, there was near unanimity on the need for a dedicated facility for providing business development services and support value chains development efforts for strengthening participation of farmer groups, producer organizations and agri-entrepreneurs in agriculture markets. Consolidating commodity groups into producer companies and supporting with initial risk capital and providing critical marketing infrastructure and logistics support eminently links up this facility with investments in agriculture marketing components. With these objectives, various alternative structural options for setting up ABDF were discussed with the project. These include:

- a. Setting up dedicated ABDF cell at CAM by hiring agri-business and finance professionals with experience in providing support services to agri-business enterprises;
- b. Partnership with Agriculture Development Finance (Tamil Nadu) Limited (ADFT) – a company promoted by NABARD with equity participation of NABARD, Government of Tamil Nadu, Commercial Banks and the private sector; or
- c. Hiring management agency for providing professional management support for ABDF component through a competitive procurement process

44. The project agreed to analyze further on these options from procurement and fiduciary standpoints and develop a concept note on ABDF covering the objectives; scope of activities; knowledge and financial products for supporting agri-enterprises; organizational structure and HR, governance mechanisms; and partnership arrangements, and share it with the Bank for approval by November 30, 2010.

45. *Department of Animal Husbandry (DAH)*. Cumulative achievements vs. targets for Phase I and II up to August 31, 2010 are as follows: Artificial inseminations A.I. (76.9%), area under fodder cultivation (63.4%), azolla demonstrations (83.8%), infertility cum healthcare camps (76%), de-worming of sheep/goats (75.45%), farmers' training programs (64.9%), farmers' interactive meetings (81%), and in-service training of veterinarians (62.4%). The mission commends the efforts made by DAH and urges that the work may be continued and further strengthened, particularly in the area of record keeping and analysis.

46. Financial achievements vis a vis targets for the above period are 56.1% only. The major reason is that in case of FY 2009-10, the administrative sanction from the GOTN for phase III sub-basins was received only at the end of the financial year, when the season for cultivation of fodder was over. Similarly, for the current financial year 2010-11, the empowered committee of the GOTN has cleared the proposals for all sub-basins only in August 2010 and the administrative sanction from GOTN is still awaited. It is suggested that a solution to this problem may be found out early so that the field programs can be taken up as per the desired schedules.

47. *Construction of borewells at the Government Livestock Farm Chettinad, Manimuthar sub-basin*. Mission observed that only 3 wells (out of 5) have been dug and encaged. The remaining work of placing submersible pumps, water pipeline and electricity connection/ supply, etc. for these wells is not yet taken up. Work for construction of remaining 2 borewells is being taken up in two alternative sites. Mission urges that DAH may take quick action to complete the work early so that additional fodder cultivation can be taken up. It will be necessary to get the electricity supply permission "on priority basis" from the Tamil Nadu Electricity Board (TNEB).

48. *Procurement of veterinary medicines*- Mission observed that there were frequent delays in procurement/supply of veterinary medicines by TNMC. Mission urges that a solution to this problem should be immediately found out and a corrective action be taken.

49. *Additional DPR to utilize the savings in AH component*. Additional activities for DAH in 44 sub-basins were discussed for finalization of DPRs and getting final clearance. These were largely agreed on, and comments received on few activities may be incorporated and DPRs may be forwarded to the Bank for final clearance.

50. *Continuation of existing IAMWARM - AH activities in the remaining years*. The DAH's program has been approved (a) for 5 years for 9 sub-basins of Phase I up to to 2011-12, (b) for 3 years for 15 sub-basins of Phase II upto 2010-11 and (c) for 3 years for 20 sub-basins of Phase III up to 2011-12. DAH has suggested that it will be desirable to extend the existing activities up to 2012 -13. For the purpose of aforesaid continuation, a financial outlay of Rs 343.744 lakh has been proposed by the DAH. It is important the DAH ensures that there is no duplication in the activities between the supplemental DPRs and the continuation of the existing plans, as all are taking place in the same sub-basins. Upon verification that no such double counting may be taking place, the mission is in agreement with this proposal subject to technical comments being incorporated and final plans sent to the Bank for clearance.

51. *Department of Fisheries DoF*- Delay in administrative sanction has hampered progress of the project and DoF's program, particularly for phase III. Manpower shortage in both Head office as well as in the field

requires urgent attention. The mission requests DoF to address staff shortage problem. Field monitors continue to face the hardship for movement as they do not get reimbursed for the expenses incurred and the area to be covered being vast, in the absence of such support, output quality and quantity would be affected. As budget is available under IEC component, suitable arrangement may be made to cover travel expenses based on actual, as agreed with PD.

52. Aquaculture in farm ponds has been carried out successfully in project areas with reported production levels exceeding 500kg by some farmers. Though observations are continued on the sustainability of the activity, results that demonstrate the extent to which activities are carried out and the production levels obtained are still lacking. *Mission recommends that DoF monitors this activity and gathers the information required.*

53. It was gratifying to see that some of the farmers were using the farm ponds for raising the stunted fingerlings for stocking in tanks and reservoirs. Though it is not clear how many ponds have been used for such activities, it would be useful to promote this type of utility of farm ponds for nursing fish seeds in large scale as envisaged under the upcoming phases of the project activities. Though uncommon, some farmers have also utilized dykes for planting high value timber trees like teak and multipurpose plants like coconuts, etc. Mission recommends that these good examples of multipurpose utilization of ponds may be disseminated.

54. Fish seed Banks suffer from water shortage and other management problems. All 12 fish seed banks have been completed and are being utilized for the seed nursing activity with varying degree of success. There is scope for further improvement in the seed recovery rate from the current level of @20%. So far only 3 seed banks (out of 12) have been handed over to the water uses association. The mission urges that the rest should be handed to WUAs as well with proper support, now that WUAs have been formed. Mission also urges that water shortage problem for seed banks should be given top priority (e.g. Seed banks in Kottaikariyar and Manimuthar sub-basins).

55. Ornamental fish culture units under Phase II continue to remain uninitiated and urgent attention is needed. It should be noted here that, among the units started in Phase I, only one unit remains functional. Hence, all care must be taken to address the administrative problems and develop proper contract with the selected beneficiaries

56. Kiosks seem to be doing brisk business in most areas, except those that are not located in proper places. Proper location selection for kiosk must be given high priority in order to ensure accessibility to people. Attention also is needed to ensure that the kiosks have proper management structure for quality fish sale. In some places though women Self Help Groups (SHG) are shown as managing the kiosks, men still hold key position in terms of fish procurement and arranging for its sale. It is essential to empower women to take over financial management.

57. Aquaculture in irrigation tanks is the major activity to be carried out in the project and expected to contribute for the substantial increase in fish production. While there was no stocking of tanks during phase I, in phase II about 2942 ha of water bodies have been targeted for stocking. Nearly 77% of the tanks have been reported to be stocked. Data on the actual production obtained from these tanks is not available though. Between the project M&E and DoF, the mission request that this important information gets captured. The mission reiterates that tank stocking and harvesting must be given highest priority, and farmers should be encouraged to stock large size fingerlings and grow stunted fish seeds.

Component C – Institutional Modernization for Irrigated Agriculture

58. The mission held detailed discussions with some WUA Presidents, Distributary Committee and Project Committee members of the Parambikulam Aliyar Project (PAP) system. The mission was informed

that in some cases 60% of WUA members were paying O&M fees. It was also reported that a majority of WUA Presidents solely retained the account books and maintained all financial records on behalf of the WUA in their homes. General meetings of the WUAs seem to be held only prior to provision of water supply in the tanks and not on a regular basis. In addition, beyond the initial orientation training for WUA Presidents organized by IMTI, no further trainings have been provided to members of the WUAs. This underscores the need to recruit Support Organizations (SO) to build the capacity of WUAs and to help them fully integrate in project activities and ensure sustainability.

59. The project envisages the recruitment of SOs to support and train WUAs with water management, operation and maintenance of systems, etc., and to train farmers and commodity groups in improved agricultural practices. The recruitment of SOs for WUAs under phases 1 and 2 sub-basins has been considerably delayed and not been concluded as financial proposals received were much higher than the estimates made by WRO. An Empowered Committee meeting took place on August 13, 2010, chaired by the Chief Secretary. It was decided to reject the proposals as presented and limit the SO activities to support and training of WUAs only. The Committee concluded that training of farmers and commodity groups should be carried out by the Agricultural Extension Department, which agreed with this proposal. The mission sees technical merit to this suggestion, however given that the RFP has already been issued and technical evaluation has already taken place, Bank procurement clearance is required to make changes at this stage. The mission recommends that the project submits a formal request listing the desired changes, duly justifying why they are needed and that they do not constitute a significant alteration of the TORs. The project should also explain that the quality of the final product and its cost does not affect the relevance of initial evaluation of proposals. The Bank will review the proposal and revert back with the decision. *Subsequent to the mission, the project submitted the aforementioned proposal, and it was approved by the Bank.*

60. SOs are needed to carry out a large amount of training and support to a large number of WUAs in a short period. However, WUA monitoring and support will be needed even after the project is completed, which should be a process owned by WRO. WRO is interested to use the services of the Irrigation Management Training Institute (IMTI) for this purpose. IMTI could indeed be used to provide training and support to field staff of WRO that would provide the actual monitoring of and support to WUAs. It was agreed that a critical review of IMTI will take place to determine its strengths and weaknesses. Based on this review, proposals for IMTI's strengthening can be prepared as well as a program of long-term support to WUA development. If found appropriate some of the proposals could be financed from project funds after obtaining necessary clearance. The mission recommends that the review be completed by October 31, 2010. *As of mid-November this has not been received.*

61. It was agreed that a small building- cum information kiosk- for each WUA would be important to give it a sense of formal existence and to keep records and hold meetings and receive and disseminate information. It was agreed that for each WUA that within the next six months fulfills a number of conditions as per Act (conduct meetings, form four sub-committees, maintain records) as well as provide land, a small office will be constructed. Cost estimates may be prepared and construction and procurement arrangements have to be decided and proposal may be submitted to the Bank for review and clearance.

62. *Information Technology* – On the subject of computers, hardwares, and peripherals, as well as setting up LAN facilities, the project was able to procure these items at a lower cost than originally budgeted resulting in savings. At the time of Project preparation, significant emphasis had been laid on training; however the utilization of funds here (7%) does not do justice to the importance and relevance of this activity. Some savings have accrued on account of the basic training being given by the State agency, IMT. However, considering that the IT awareness level in the state is high, planning for the advance level training and basic training for staff who will need to work on computers once EIMS is introduced must be planned well in advance of the software development.

63. There has been no movement of Funds for operating and recurrent expenses. This is explainable for the maintenance expenses on Computer HW and SW as these are still covered under warranty due to the delays in their procurement. However, a point of concern is the non-positioning of specialized staff for the IT cell and not mobilizing the IT cell with the required infrastructure and support. This will become critical once the EIMS Consultants commence work and demand their interactions with the counterpart team. Action on the staffing and mobilization of the IT Cell at all levels needs to be given priority.

Component D –Water Resources Management

64. *SWaRMA*. The mission discussed the subject of SWaRMA with WRD and MDPU. This has been a long pending issue that has seen little progress to date and happens to be a legal covenant under the project. GoTN had issued a GO, dated April 13, 2009, for the establishment of SWaRMA. In the last mission, the team was informed that additional proposals for SWaRMA are under circulation in the Government. The mission learned that at this stage no additional proposals are being considered, and that it is proposed to establish SWaRMA based on the GO issued. By the aforementioned GO, GoTN would form SWaRMA as the state-wide focal agency for sustainable inter-sectoral water management. The main function of SWaRMA will eventually be to regulate the water resources of the State in a sustainable manner within a river basin framework. Government has prepared financial proposals for the project to finance specialists for and operational costs of SWaRMA for the remaining duration of the project.

65. The Mission and staff of WRO reviewed the proposed 18 functions of SWaRMA and agreed on the functions that can realistically be carried out during the next three years. Three clusters of functions were identified:

- Development of a common data base for water quantity and quality, as well as existing bulk allocations in the State. At the moment bulk allocations are given for industry and cities' drinking water. The data base should also include data on water available for irrigation. The data base should be developed in such a way that it does not only capture all available data in a synchronized manner, but also allows various types of analyses of data, that will form the basis for SWaRMA's regulation of water resources. This activity relates to functions 5, 7, 8, and 15 in the GO.
- Review all water-related legislation, including the State Water Policy (2002), the Farmers Management of Irrigation Systems Act, and relevant Regulations. Based on the critical review, prepare amendments and modifications to improve the legislation. It was agreed that it will be important to include in the State Water Policy the issue of regulation of water resources and SWaRMA. This activity relates to functions 1, 2, and 14 in the GO.
- River Basin Boards and River Basin Master Plans are gradually being developed (so far two Boards have been set up and two master plans have been developed). SWaRMA's task is to review and approve the master plans. This activity relates to function 10 in the GO.

66. It was agreed that an estimate for consultants and training will be added to the budget proposed to be financed by the project. It was agreed that based on agreement reached, the final work plan for SWaRMA would be forwarded to the Bank by November 15, 2010 for clearance and immediate implementation.

67. *Cooum* - The Cooum Sub-basin Restoration and Management (CSRMA) Unit was formed in 2008 to work with all stakeholders in the Cooum Sub-basin to develop options for the restoration of the sub-basin. Under IAMWARM, proposals are under preparation for the rehabilitation of 60 tanks in the upper part of the Cooum sub-basin (rural) under Phase IV sub-basins. These proposals are not different from the proposals under other sub-basins and can be financed from project funds to be undertaken by the implementing agencies under the project, after submitting the DPRs to the Bank and receiving the necessary clearance.

68. The CSRM Unit is also working with stakeholders such as Chennai Metro Water, Chennai Metropolitan Development Authority, TN Pollution Control Board, and the TN Slum Clearance Board to develop proposals that will lead to the restoration (water quality and quantity, siltation, tidal inflows, etc.) of the sub-basin in an integrated manner. Some of the proposed activities may be controversial, such as the resettlement of people who now live along the Cooum River. Although the project will not finance any of the proposed investments within Chennai and will be limited to investments in the rural part of the sub-basin, there is a risk that it will have an indirect link to the activities that are being undertaken in the rest of sub-basin. A request was therefore made to the CSRM Unit to ensure that any resettlement of people done by the Slum Clearance Board is carried out in compliance with relevant bank operational policies and the resettlement framework that was prepared for IAMWARM. It was agreed that the DPR for the Cooum sub-basin would be sent to the Bank for review by November 30, 2010.

V- Safeguards

69. *Working of the Environmental Cell (EC) in MDPU.* The mission is pleased to note that the EC has adopted the reporting format developed earlier and is now distinguishing between impacts due to project activities and impacts in non-project areas. The mission also noted that its earlier comments have been suitably incorporated in the final draft report on environmental impacts emanating from sugar industries. It is suggested that the EMF is presented in a matrix (tabular) format giving the specific mitigation action, its frequency of implementation and responsibility of authorized personnel for easy follow up in the final report.

70. *External audit of ESMF implementation.* While the bank has cleared the TOR for the same, the EC must contract the external consultants immediately for the audit of ESMF. This is a critical agreement and mission expects that MDPU will fulfill it soon to overcome the time lag.

VI- Financial Management & Disbursement

| Financing from | IDA | IBRD | Total |
|--------------------------|--------|--------|---------------|
| Allocation | 155.3 | 335 | 490.3 |
| Disbursed * | 105.44 | 50.12 | 155.56 |
| In pipeline with Bank ** | 5.56 | 0.81 | 6.37 |
| Total Disbursement | 111 | 50.93 | 161.93 |
| % Disb. | 71.47% | 15.20% | 33.03% |

* includes SA-Advance of USD 8.00 million under IDA and USD 17.00 million under IBRD

** Claims in pipeline with the Bank (relating to the quarter ended June 30, 2010)

71. The project has been timely in the submission of the quarterly IUFRRs and disbursements have been made for expenditures reported till quarter ended June 2010.

72. *Budget & Funds Flow:* The budget for the financial year 2010-11 is INR 3848 million which adequate and compares favorably with the revised budget estimate of 2009-10 which is INR 3235 million. There have been no constraints in funds availability (including issue of LOCs to WRO) with various line departments / agencies.

73. *Accounting, Financial Reporting and Internal Control.* Since the previous mission the project has (a) corrected the figure of retention money reported in the IUFRR to reflect only the unpaid retention amount on closed contracts; (b) provided training to Phase III sub-basin accounts staff on financial management and

reporting aspects under the project. The MDPU is receiving monthly expenditures reports from all the line departments, which are also reconciling the same with the expenditure recorded in the books of the state AG (A&E) on a quarterly basis; adjustments, if any, on account of the reconciliation are being effected by MDPU in subsequent quarter's IUFRR. The mission met with the AG (A& E) to re-iterate the need for the MDPU to obtain the report on expenditure recorded in the AG's accounts on a quarterly basis which would enable the MDPU to independently cross verify the reported number by line departments. The AG agreed that henceforth the expenditure report would be sent to the project on a quarterly basis after their accounts are closed. Two line departments, WRO and Animal Husbandry have been unable to settle long pending advances related to WUA elections and procurement of drugs & training respectively aggregating to approx INR 50 million. It was agreed that the same would be settled by December 31, 2010.

74. *Internal & External Audit.* The external audit for the year ended March 31 2010 for both the main project and TNAU component, is in progress, with field work having been completed and the reports are expected to be submitted latest by November 30, 2010. The project has also provided its response to the audit observations in FY 2008-09 audit reports & has taken action on the audit findings by way of adjustment in claims in respect of items identified as in-eligible. The internal audit report No (V) was shared with the mission and the draft report No VI has been shared by the auditors with the project. The MDPU also facilitated a tri partite meeting with various line dept and internal auditors to address the findings in IA reports I to IV and proposes to have a similar joint review for report V and VI. It was agreed that the report of action taken will be shared with the Bank. At the request of the project, the internal auditors have collated sub-basin wise project expenditure, based on bills submitted to treasury and have in some selected sub-basins noted that there is a difference in the expenditure reported by the line dept to the MDPU (which is also reconciled with the AG) and that collated by the auditors; the project is reviewing this and will address this in the next joint review discussion. Action, if necessary, including sending note of error to AG will be taken by the project

VII- Procurement

75. The issue regarding Bank's disagreement to concur the proposal for conducting one time negotiation in 55 cases of works contracts of Madurai region WRD was discussed on September 23, 2010. It was clarified that Bank had already conveyed its inability to concur with the proposal for price negotiation (e-mail of September 18, 2010). The Project Director mentioned that the project was not in agreement with Bank's views and reiterated project's proposal for conducting negotiation with the lowest evaluated bidders to try to obtain satisfactory contracts by reallocation of risk and responsibilities based on para 2.63 of procurement guidelines, by reducing the time for payment from 28 days (as mentioned in the bidding document GCC 43.1) to 14 days. The matter was discussed in detail and Bank reconfirmed its position conveyed earlier that price negotiation is not permissible. Bank further clarified that at the time of project negotiation in December 2006 one of the agreed NCB conditions was "*Except with prior concurrence of World Bank there will be no negotiations of price with the bidders, even with the lowest evaluated bidder*". In this case, Bank is of the view that the justification provided for conducting negotiations is not sound.

76. The status of project consultancy for Decision Support System (DSS) was discussed and the project advised that REOI for this consultancy has been published in the local news papers on September 20, 2010 and Bank has taken urgent action for its publication in UNDB online. The project was requested to start preparing the draft RFP and be ready with it before finalization of the short list.

77. The status of project consultancy for Construction Quality Management and Technical Supervision was discussed and it was advised by the Project that the draft contract is being sent to the Bank for review September 24, 2010. Bank will review the same on priority.

78. The proposals received for Enterprise Information management system are under technical evaluation by ELCOT. Bank has requested for re-evaluation of technical proposals and to forward the revised Technical

Evaluation Report for review within 10 days. The proposals should be kept valid till the award of contract is finalized.

79. The proposal of the project for “Fencing to Solar poly House Chiller Dryer” and procurement of Power Weeder 6 nos instead of 113 nos was discussed and agreed.

80. The proposal for procurement of Software and Scientific Instruments for Design wing of WRD was discussed. The proposal is in the form of a procurement plan for the Design wing of WRD. This was reviewed and agreed with the condition that item nos 6 and 7 of this procurement plan should be procured under the right component.

81. The status of proposals under Irrigation Research Fund (IRF) was discussed. The project advised that they have sent clarification to the Bank on August 26, 2010 confirming that World Bank procedures have been followed in the selection of 5 winning proposals. Bank will revert with final decision on the IRF.

82. The responses received from the project on the findings/deviations noticed during the Procurement Post Review of contracts awarded during the period July 01, 2008 to June 30, 2009, are under review by the Bank.

83. The mission requested MDPU to send a list of all post review contracts awarded during the period July 01, 2009 to June 30, 2010 to the Bank for initiating the exercise of procurement post review done. It was agreed that this would be done prior to October 07, 2010.

VIII- Next mission and Task Team Leader (TTL) change. It was tentatively agreed that the next implementation support mission will be scheduled for Jan-Feb 2011. The mission also informed the GOTN that the new TTL for IAMWARM project from the Bank will be Edward Cook, and he will be assuming his responsibilities effective October 1, 2010.

IX- Key Agreed Actions

| S.No | Actions | Date by | Responsibility |
|------|---|--------------|-----------------------------|
| 1 | Prepare and submit table on project savings (Done.) | Oct 31, 2010 | MDPU |
| 2 | Submit Implementation Progress report and Environmental and Social progress report- (Done.) | Oct 31, 2010 | MDPU |
| 3 | 10 Support Organizations in place | Nov 15, 2010 | WRO, MDPU |
| 4 | Remaining 14 SOs in place | Jan 15, 2011 | WRO, MDPU |
| 5 | Final SWARMA work plan and send it to the Bank for clearance | Nov 15, 2010 | WRO, MDPU |
| 6 | Issue the REOI for the External Env & Social audit Consultancy and finalize RFP | Nov 15, 2010 | WRO, MDPU |
| 7 | Submit Data on Land acquisition, if any | Nov 15, 2010 | WRO, MDPU |
| 8 | Update and consolidate Procurement plans and send to the Bank (Done for most line departments.) | Nov 15, 2010 | All line departments, MDPU |
| 9 | Award the Third Party Construction quality supervision | Nov 30, 2010 | WRO- MDPU |
| 10 | Prepare additional DPRs for various line departments as discussed with the Bank mission and forward them to the Bank. (Done for most line departments.) | Nov 15, 2010 | MDPU & all line departments |
| 11 | Send confirmation for phase IV sub-basins | Nov 15, 2010 | MDPU |
| 11 | DPRs for phase IV sub-basins (Done for most line departments.) | Nov 30, 2010 | All line departments |
| 12 | Procurement of balance core cutters, speedy moisture meters and weighing balances required for Phase III works in Madurai and Chennai Regions be completed. | Nov 15, 2010 | WRO |
| 13 | Convene orientation and training sessions for WUAs to make them fully conversant with OK card system. | Nov 30, 2010 | WRO |
| 14 | Engineer-in-Chief to take requisite actions to commission all “Nuclear Density Testers” (lying unpacked and unused in the regions since TN-WRCP period) for deployment on the work of raising and strengthening of earthen tank bunds in Phase III works. | Dec 31, 2010 | WRO |
| 15 | Provide hands-on training to new Assistant Engineers (and re-training to other concerned Assistant Engineers who had earlier received training) in batches to make them conversant with testing equipment, testing procedures and making them fully capable of conducting quality control tests themselves. | Nov 30, 2010 | WRO |
| 16 | Formulate Implementation Action Plan for consolidation of earth fill on slopes of all such tank bunds which were earlier strengthened without adequate compaction of sides and suffer from erosion gullies. | Nov 30, 2010 | WRO |
| 17 | Send Procurement Plan for 3 balance Phase III sub-basins WRO- | Nov 15, 2010 | WRO |
| 18 | Revise DPR for 1 balance phase III sub-basin WRO and send to Bank. | Nov 15, 2010 | WRO |
| 19 | Organize Development market place for agribusiness sector | December 15, | MDPU, Ag |

| | | | |
|-----|---|--------------|-------------------------------|
| | | 2010 | marketing dept |
| 20. | Contracting the independent Compliance Audit for ESMF | Nov 15, 2010 | Environment Cell Division |
| 21. | An environmental and economic impact assessment of agricultural practices/technologies demonstrated in various sub-basins | Nov 15, 2010 | TNAU |
| 22. | Engage consultant for assessment of rainwater harvesting | Nov 30, 2010 | AED |
| 23 | Send proposal for utilization/reallocation of project savings | Nov 30, 2010 | MDPU and all line departments |
| 24 | Send a list of all post review contracts awarded during the period July 01, 2009 to June 30, 2010 | Oct 7, 2010 | MDPU |
| 25 | Submit the external audit report for 2009-10 for both the Main project and TNAU Component | Nov 30, 2010 | MDPU |
| 26 | Internal Audit: Share Report No VI | Oct 31, 2010 | MDPU |
| | Report of settlement of IA observations – report I to IV | Oct 15, 2010 | MDPU |
| | Response to IA observations (after joint sitting with line dept and internal auditors) | Dec 31, 2010 | MDPU |
| 27 | Settlement of advance for WUA Elections (WRO) & to TNMSC/ TNLDC and Training (AH) | Dec 31, 2010 | WRO & AH Dept |

Annex I a: Component A: irrigation Infrastructure Rehabilitation works

Construction Quality Control (QC) / Quality Assurance (QA)

The mission (R.K. Malhotra) made field visit to the following works in Chennai and Madurai Regions. Mission observations / comments and suggestions are outlined in detail below:

A. Poiney sub-basin, Chennai Region

1. Rehabilitation and Modernization of Head works, Supply Channel and Tanks in West Main Channel and South Main Channel in Sholinghar, Walaja and Katpadi Block of Katpadi and Walaja Taluk in Vellore District. (Package No.1 /IAMWARM /WRD /Works /II/2008-2009)

This package, worth Rs.574.34 lakhs was awarded on 20.10.2009 with 20.04.2011 as the scheduled date of completion. As of August 31, 2010, financial completion level of about 60% has been achieved. The works are expected to be completed by the scheduled date.

The mission visited the following rehabilitation works:

(i) Poiney Anicut (ii) East Main Canal (Head reach) and (iii) Kummananthangal Tank

(i) **Poiney Anicut works:** Workmanship of the M20 grade concrete skin wall provided over the upstream face and top of the masonry body wall of the anicut was observed to be satisfactory. Likewise, the upstream apron concrete exhibited satisfactory workmanship.

Construction Procedure, Quality Control Tests and Construction Quality

(a) **Construction Procedure:** *Perusal of the drawing and photographic record indicates that correct procedure was adopted on the construction of skin wall which included: removal of top course of masonry to ensure retention of the existing crest level after placement of concrete; provision of grouted steel anchors in the masonry on upstream face; provision of temperature reinforcement; deployment of mechanical concrete mixer for production of concrete and using appropriate “gauge boxes” for volumetric proportioning of concrete mix ingredients.*

Further Improvement Needed: Measured quantity of water should be added to strictly maintain the water-cement ratio (W/C) in the range 0.55-0.60. It should not be allowed to exceed 0.60. Accordingly, the water containers (plastic buckets) should be calibrated through paint marks to depict the quantity of water contained there-in against the respective paint marks. Also, plastic mugs of ½ litre and 1.0 litre capacity should be kept at site for addition of calibrated quantity of water. This is essential to achieve high “durability” of concrete which is associated with low water-cement ratio. *This improvement should be implemented in future works.*

(b) **Quality Control Tests:** It was satisfying to note that the routine quality control tests on sand (gradation and fineness modulus); coarse aggregate (gradation) and concrete (28-days compressive strength of cubes of M15 and M20 grade concrete) had been conducted and documented. The test results conformed to the Indian standard “acceptance criteria”. Wherever, the coarse aggregate did not initially confirm to the IS383 requirements (single size/graded aggregate), it was apprised by the field quality control engineers that the aggregate was broken to smaller size and sieve analysis conducted again to fulfill the acceptance criteria.

Further Improvement Needed: Routine quality control tests on sand relating to (i) bulking of moist sand (ii) presence of impurities (silt/clay) in sand and (iii) presence of organic impurities should also be conducted in future. These are simple tests and require only transparent graduated plastic cylinder (for bulking and silt/clay impurities tests) and transparent graduated plastic bottle (for organic impurities test). The mission explained the procedure for conducting these tests. Write-Up, illustrated with sketches and examples, has been furnished to Chief Engineer, Madurai Region and also to MDPU for circulation to all the construction and quality control engineers. Making “allowance for bulking of moist sand” in the concrete mix was also explained to the quality control Engineers. *This improvement should be implemented in future works.*

(c) **OK Card System:** OK card system is being maintained and OK cards are being filled duly perused by the quality control engineers at regular periodic intervals and requisite remarks are recorded against the respective activities to signify OK of the particular activity or the needed further action to be taken by the contractor. This system is helping in promoting construction quality of works. Minor improvements needed in filling the OK cards were explained to the construction & quality control engineers. These include: mentioning reinforcement cover, water-cement ratio, and slump. As already earlier suggested, the OK cards incorporating the activities in the local Tamil language (besides the ones in English language) should be introduced on the works where, presently, there are in only English language.

(d) **Construction Quality :** Based on visual observations and perusal of quality control tests and the OK cards, the overall construction quality seems to be of acceptable standard.

(e) **Involvement of WUAs:** It is suggested that the selected WUA representatives should be provided orientation and training on the OK card system (incorporating the activities of works printed in Tamil language) to make them conversant with this system and, thereby, enable them to participate in the quality management system (QMS) for promoting construction quality.

(ii) **East Main Canal works:** These works visited in the head reach comprise plain concrete vertical retaining wall and RR Masonry in 1:4 mortar on side slope joined with plain concrete horizontal key. Overall, the workmanship and the construction quality, based on the routine quality control tests conducted and recorded similar to the ones outlined above for the Poiney Anicut Works and the perusal of OK cards, seem to be of acceptable standard. Further improvements needed are the same as have been mentioned for the Poiney Anicut works which be implemented in future works.

(iii) **Kummananthangal Tank**

Raising & Strengthening of Tank Bund: *It was very encouraging to observe that the earlier grey area associated with inadequate compaction of earth fill placement was now being addressed through:*

(a) Placement of earth fill in proper layers;

(b) Deployment of power roller for compaction of earth fill;

(c) Deployment of a simple device comprising 1.2m x 0.75 plate fixture attached to the boom of hydraulic excavator (in compliance with the previous mission suggestion) for effective consolidation of the loose earth fill on side slopes; and

(d) Conducting “in-place density tests “of compacted layers not only in the central portion but also on either side of the centre line.

Perusal of the record of density tests of 3 samples taken from the first layer at different chainages at the centre line, 0.60 m left of centre line, and 0.80m right of centre line indicated compaction efficiency in the range of 87% to 91% Proctor density compared to the specified density of 95%. The compaction achieved being less than 95% Proctor density, additional rolling was reportedly done and samples from the re-compacted layer were again taken from the same locations and re-tested which, as per the documented test record, indicated compaction efficiency of the re-compacted layer to be in the range of 95% to 98% Proctor density. *Thus, correct construction procedure is being followed.*

Quality Control Testing Equipment; Competency of Quality Control Engineers

In response to the earlier mission suggestion, procurement of about 5% requirement of the testing equipment for all the 4 Regions has been arranged to enable the quality control engineers to conduct the needed routine quality control tests themselves instead of the earlier practice of getting these done elsewhere from the nearby Polytechnics/Engineering colleges which used to take abnormally long time. The mission interacted with the quality control engineers and observed that they had become conversant with the use of the testing equipment and the testing procedure. *The mission was particularly impressed by the competency and enthusiasm exhibited by Mrs. Uma Rani, Assistant Engineer, quality control.* To the mission suggestion that the construction Assistant Engineers should also get fully conversant with the testing equipment and testing procedures, the concerned Superintending Engineer assured that this would be achieved by providing on-job and hands-on training to them. *It is essential for WRO to procure the balance testing equipment the soonest, especially for the Madurai and Chennai regions, to cope up with the work load of Phase III works.*

Mechanized Compaction of Earth fill: The mission observed the deployment of “Plate Compactor” (1.20m x 0.75m steel plate fixture attached to the boom of hydraulic excavator) on the consolidation of loose earth fill on the upstream slope of the Kummananthangal tank bund. This device is proving effective in achieving the requisite objective. To the mission query, the contractor of Package No.1 intimated that he had mobilized 4 such devices besides 3 heavy vibratory power rollers for mechanized compaction of earth fill on the raising & strengthening of 23 tanks included in his package. *Thus, it is satisfying to note that the Bank Mission suggestion relating to the deployment of “Plate Compactors“, mechanized compaction has taken firm roots and is being implemented.*

2. Rehabilitation and Modernization of East Main Channel and Nadhi River in Arakkonam and Kaveripakkam Block of Arakkonam Taluk in Vellore District. Arthur Big & Small Tank.

(Package No.04 / IAMWARM/WRO/POY/WORKS/phaseII/2008-09.)

This package, worth Rs.564 lakhs, was awarded on 20-10-2009 with 20-04-2011 as the scheduled date of completion. As of August 31, 2010, financial completion level of only about 35% has been achieved. The execution of rehabilitation works shall need to be speeded to achieve completion by the target scheduled date. The mission visited the following rehabilitation works:

(i) Arthur Big & Small Tank (ii) Re-constructed Sluice, and (iii) Repairs to Weir.

(i) **Arthur Big & Small Tank:** Mechanized compaction of 2 earth fill layers through power rollers has so far been completed on both the Big and the Small Tank Bunds. Perusal of the density tests of the 2 compacted layers (out of the planned 3 layers) indicated that, initially, compaction of layers to specified density was not achieved and additional rolling had to be done and re-tested to achieve the specified 95% Proctor density. 10,700 m³ earth fill was reportedly placed and compacted on the Arthur Big Tank and 3,600 m³ on the Small Tank. 17 density tests have been conducted on the Big Tank Bund and 16 tests on the earth fill placed on Small Tank duly documented in the QC register. “Frequency of testing” (one test for 300m³ of earth fill placement) is more & less, being broadly fulfilled. The field engineers assured that the requisite “frequency of testing” would be fulfilled in totality.

- **Classification of Borrow Soil & Compaction Parameters:** It was satisfying to note that classification of borrow soil as well as the determination of OMC and MDD of borrow soil were got done from the nearby polytechnic. The soil classified as SC (clayey sand), is suitable for the raising & strengthening of the tank bund.

- **Compaction Equipment Mobilization:** To the mission query, the contractor of package No.4 intimated that he had mobilized 3 vibratory power rollers and 3 “Plate Compactors” (1.2m x 0.75m steel plate fixture attached to the boom of each of the 3 hydraulic excavators) for compaction of earthfill on the 28 tanks in this package. Presently, no “Plate Compactor” was observed to have been deployed on the Arthur big & Small Tank Bunds for compaction of the loose earthfill on the slopes. The contractor assured that it would soon be deployed on this tank. *Mobilization of 3 “Plate Compactors” by the construction agency for consolidation of loose earthfill on slopes signifies awareness on mechanized compaction which is a very encouraging step in the right direction.* This momentum should not only be maintained but be increased to ensure that the earth fill on both the upstream and downstream slopes of tank bunds is fully consolidated through these “Soil Plate Compactors”.

- **Ok Card System** This System is being maintained and the minor improvements suggested to the field engineers at the work site mention of reinforcement cover, water cement ratio etc in the cards should be carried out. In future, the OK cards incorporating the sub-activities of rehabilitation works in Tamil Language (besides the ones in English Language) should be introduced in order to have the involvement of WUAs also.

(ii) **Repairs to Weir** *The weir has been rehabilitated through construction of skin wall in M 20 grade concrete as per technical guide lines duly incorporating grouted anchors and temperature reinforcement.* Quality control tests on water, cement, steel, sand, coarse aggregate, and 28- days compressive strength of concrete cubes have been done and documented. The workmanship and construction quality are of acceptable standard.

Further Improvements Needed Reference be made to the improvements listed for the Poiney Anicut Works under paras (i) (a) and (i) (b) for requisite implementation in future works.

Orientation & Training of Engineers Now that the quality control testing equipment has been procured and delivered to the respective Regions, the respective Regional Chief Engineers should arrange to provide “hands-on-training” to the AEs/AEEs construction and some of the quality control engineers to enhance their capability to enable them to conduct the routine quality control tests themselves. Presently, it was noted by the mission that the construction AEs engaged on this package were not fully conversant with the testing procedures. It is also essential that the Executive Engineer should make himself conversant with the testing procedures as well.

B. Upper Vaigai Sub-basin – Madurai Region

3. Rehabilitation of Irrigation Infrastructure of the Upper Vaigai Sub-basin in Theni District.

(Package No. 01/IAMWARM/WRO/UVG/Works/II – 2008 – 2009)

The works in this package comprising rehabilitation of 4 Anicuts, 9 Tanks and 2Km of Supply Channel worth Rs 199 lakhs are reported to have been completed on 06.02.2010. The mission visited one of the four anicuts namely Kunnur Anicut rehabilitated at a cost of Rs 84 lakhs.

Kunnur Anicut Works The rehabilitation of this Anicut comprises provision of M 20 grade concrete skin wall to the existing masonry body wall; construction new downstream stepped apron in M 10 concrete topped with RCC M 20 concrete wearing coat and the downstream cut-off wall.

Mission Observations

(i) **Construction Procedure** Perusal of the drawing and the photographic record indicates that the construction of skin wall confirmed to the technical guide lines viz, provision of L-shaped anchors duly grouted in 50mm dia holes in the body wall and provision of temperature reinforcement. Concrete was produced in a mechanical mixer and volumetric proportioning of concrete mix ingredients was done through gauge boxes both for the construction of skin wall and the downstream apron.

(ii) **Quality Control Tests** As per the test record, the following quality control tests were conducted:

- Test on water got done from the Regional Testing Laboratory, Madurai (Dept.of Industries and Commerce)
- Test on reinforcement steel got done from Raja College of Engineering and Technology, Madurai.
- Tests on soundness; impact & crushing values; specific gravity; water absorption of coarse aggregates as well as tests on soundness and specific gravity of sand got done from Raja College of Engineering and Technology, Madurai.

In addition to above, tests on the Portland Pozzolanna (IS 1489) used in concrete were also got conducted and recorded which included initial and final setting time, consistency, and 7 day compressive strength of cement. Test on sand (gradation and fineness modulus) was also recorded.

In respect of the concrete mix, compressive strength of cubes was also determined and documented.

Thus, comprehensive quality control testing of “ inputs ” was done

(iii) **O.K Card System** OK card system had been maintained and OK cards had been filled duly perused by the quality control engineer who also recorded his remarks, wherever needed.

(iv) **Workmanship, Construction Quality and Further Improvements** The Mission observed the skin wall concrete surface to have suffered erosion and pitting at several locations. Mastic filler in some of the joints (spaced at about 3 m intervals) had also come out giving hollow and irregular appearance of these joints. The work was completed in June 2009 and heavy floods were reported to have flowed over the anicut during October and November 2009 causing erosion / pitting in the concrete surface. A separation crack at the junction of vertical skin wall with the horizontal concrete surface was also observed. The mission during interaction with the construction and quality control engineers observed that they were not adequately conversant with the significance / importance of water- cement ratio (W/C) in the concrete mix. Furthermore, no bulkgage test on moist sand was conducted and, accordingly, no allowance for bulkgage of such sand used in the concrete mix was made. It is felt that in case the W/C had been kept low, viz, in the range of 0.55 – 0.60 ; allowance for bulkgage of moist sand in concrete mix made; and proper compaction of 15 cm thick RCC skin wall (provided in the top horizontal surface) done followed by adequate curing, the concrete could not have suffered erosion & pitting. *For achieving better workmanship and construction quality, the mission held a*

brief technical session at the work site and explained these key requirements to the field engineers to enhance their knowledge for making the needed improvements in phase III works proposed to be taken up shortly and also in the ongoing Phase – II works. Use of a simple “vibratory plate compactor”, duly illustrated, was also explained. Photo copy of this simple device was also furnished to the Chief Engineer, Madurai Region, for making colour prints to be given to all engineers to enable them to ask the concerned construction agencies for deployment of such vibratory device in the future Phase III works. It was also suggested that, in future, design mix concrete for M 15 and M20 mixes be used and the mix ingredients by weight be appropriately converted into volumetric proportioning and that the water cement ratio (W/C) be strictly maintained for long term durability of concrete.

In respect of the minor separation observed at the junction of vertical skin wall concrete with the horizontal skin wall concrete over the body wall of the anicut, it was explained to the field engineers that, in future works, the concrete should be placed in alternate panels monolithic against the vertical and horizontal surfaces and, that, no construction joint be provided between vertical and horizontal concrete surfaces. This would avoid occurrence of separation between the two concrete surfaces.

C. Varattar Nagalar Sub-basin – Madurai Region

4. Rehabilitation of Irrigation Infrastructure in Varattar Nagalar Sub-basin in Theni District.

(i) **Rehabilitation of Chakkilichikulam Anicut** This work, costing Rs 13 lakhs, was reported to have been completed in March 2009. The routine quality control tests on “ inputs ” had been conducted and documented and OK card system was maintained during the execution of this work comprising provision of coping concrete over the masonry body wall; pointing of the masonry joints on both the U/S & D/S of body wall in 1:3 mortar; and construction of downstream apron in concrete terminating in the cut off wall. To the mission query, it was appraised that the joints in the masonry body wall of Anicut were duly raked to a depth of about 25 mm, cleaned with water, and thereafter filled with 1:3 (cement : sand) mortar followed with water curing for 3 days. *This procedure conforms to the technical guide lines.*

The mission noted that the quality control tests on sand relating to the presence of impurities (silt / clay) and presence of organic impurities had not been conducted. These tests should also be conducted and documented in future. A brief write – up illustrated with sketches and examples on these tests was furnished to the Chief Engineer, Madurai Region to make copies and supplied to all AEs & AEEs to enable them to conduct and document these tests during execution of future works.(Reference be also made of Para 1 (i) a under Poiney Anicut works on maintaining the water-cement ratio (W/C) of concrete mixes in the range of 0.55 – 0.60 for the long – term durability of concrete).

(ii) **Rehabilitation of Andipatti Tank & Weir:** These works were reported to have been completed in July 2009 and September 2009 respectively.

Andipatti Tank : The Mission visited this tank. *It was satisfying to observe that there was no occurrence of any longitudinal cracks on the top bund.* Perusal of the photographic record and inter-action with the field engineers indicated that the loose earth fill on slopes was duly consolidated through the impact of the bucket of hydraulic excavator.

The mission advised the field engineers that in future works such consolidation should be done through the operation of hydraulic excavators with “ Plate fixture (1.20 m x 0.75 m or 1.50 m x 0.75 m) ” attached to their booms, which provide speedy and effective consolidation .

D. Arjunanadhi Sub-basin – Madurai Region

5. Package: Slice No. 3 – 02 / IAMWARM/ AJN/WRO/UVB/NCB/2006-07

(Phase I Work)

SATTANERI ANICUT

The Sattaneri Anicut, costing Rs.31.66lakhs, is a part of the Package / Slice No 3 – 02 of Agreement value of Rs.306.96 lakhs awarded on 21.07.2009. Construction of this Anicut is reported to have been completed in February, 2010. The other works in this package are expected to be completed in totality by October 31, 2010.

(i) **Workmanship** *The workmanship (line/grade) of this work was observed to be good. The concrete surface of the body wall of Anicut exhibited use of good form work.*

(ii) Construction Procedure, Quality Control Tests, OK Card System, Construction Quality

- **Construction Procedure** Construction procedure conforming to good engineering practice had been adopted on this work. Concrete was reportedly produced in the central Batching & Mixing Plant located about 20Km away and transported to the work site through transit mixers. Prior to initiating construction, the existing damaged masonry anicut was dismantled, area thoroughly cleared of debris/jungle growth and foundations properly prepared to the designed levels duly checked and okayed by the quality control engineer.

- **Quality Control Tests** Needed quality control tests on all inputs (sand, aggregate, cement, concrete cubes) were done and recorded. Portland Pozzolana Cement was used in construction. However, the tests on sand relating to the presence of organic/silt & clay impurities and bulking were not conducted.

- **OK Card System** It was highly satisfying to observe that a comprehensive OK card system had been maintained throughout the execution of this Anicut. The OK cards were properly filled, duly perused by the quality control engineer at regular intervals and the job specific / remarks recorded by him in the cards. The only deficiency being that the actual “cover” of reinforcement had not been recorded. This must be recorded in future RCC works, being of vital importance from consideration of durability of concrete structure.

- **Construction Quality** Visually and based on the quality control test record, the quality of construction can be rated as of acceptable standard.

- **Mission Observations & Suggestions for Further Improvements in Future Works**

Perusal of OK cards indicates that, initially, the concrete mixes of water-cement ratio (W/C) 0.80 was used. Subsequently, it was got reduced to 0.70 by the quality control engineer. This was a good intervention by him. Again, as per his remarks recorded in the Ok card, he insisted on further reduction of W/C to 0.65. Notwithstanding the fact that the W/C of 0.65 was still on higher side, the effort of quality control engineer to gradually get this reduced from 0.80 to 0.65 was a step in the right direction for the long-term durability of concrete. *The enthusiastic efforts of Mr. R. Thangaraj, Assistant Engineer, Quality are appreciated.*

The mission held a brief technical session at the site and explained the key quality control aspects to the construction and quality control engineers with particular reference to “W/C ratio” and “cover of reinforcement”. W/C ratio being the single most important factor influencing the strength and “durability” of concrete structures, it needs to be kept as low as possible and not allowed to exceed the range: 0.50 – 0.55 for important works. In no case it should exceed 0.60. In such situations where the concrete is to be transported from the central Batching & Mixing Plant located at a long distance (B & M Plant being reportedly located at about 20 Km distance from the construction site in case of Sattaneri Anicut construction), low W/C ratio can be maintained only by addition of “super-plasticizer” in the concrete mix in the B & M Plant as else

substantial loss of slump would occur by the time the concrete is transported to the placement site. A super plasticizer is a chemical admixture which acts as a “water reducer”. it allows production of concrete of higher workability with the same W/C ratio without addition of any extra water. Various types of super plasticizers are available namely: MLS, SNF, and SMF types. The CE type super-plasticizer (Poly Carboxylic Ether) is the “New Generation Super plasticizer” and gives water reduction upto about 35 percent. The mission suggested that in such future works, associated with long haul of concrete mix from the B & M Plant site to the placement site, super plasticizer in the concrete mix should be used. The dosage of super plasticizer may be kept in the range of 0.50 % – 0.75 % of the weight of cement in the concrete mix. The mission also explained the significance of the “cover” of reinforcement steel and suggested that, in future, the quality control engineers must personally check the cover during erection of reinforcement by the contractor and ensure that it conforms to the one specified in the drawing. Provision of less cover would reduce the life of RCC structure.

E. Sevalaperiyar Sub – Basin- Madurai Region

6. Package: 01 / IAMWARM / WRD / SPR / Works / III / 2009 – 2010

(Phase III Work)

KADABAMKULAM TANK

The rehabilitation of Kadabamkulam tank, costing Rs. 31 lakhs, is a part of the above referred package of the Agreement Value of Rs.329.62 lakhs awarded on 14.07.2010. Scheduled to be completed during 18 months contract period.

- **Construction Procedure** Raising & strengthening of this 1762 m long tank commenced very recently on 23.09.2010. It involves raising of the bund by about 1.50 m through placement of 12,800 m³ of earth fill. *It was very satisfying to note that the requisite compaction parameters were determined well in advance of the commencement of work.* OMC and MDBD of borrow area soil were got determined by the quality control engineers from the main Quality Control Laboratory at Madurai on 20.07.2010. Classification and detailed gradation of borrow soil was got determined from Raja College of Engineering & Technology, Madurai on 06.08.2010. Soil classified as CI is suitable for placement & strengthening of tank bund.

At the time of the mission visit, first earth fill layer of 23 cm thickness had been placed in about 500 m length of tank bund. *It was very satisfying to observe that compaction of this layer was being done through deployment of “Vibratory power roller ” It was also very encouraging to observe that, in compliance to our earlier suggestion, the compaction of earth fill on slope was being compacted through deployment of hydraulic excavator with “ Plate Fixture” attached to the boom.* To the mission query, the contractor intimated that he had mobilized 2 “vibratory power rollers” and one “plate fixed hydraulic excavator” for compaction of earth fill on this tank. *Thus, the awareness on mechanized compaction of earth fill and its actual implementation is catching up around in real right earnestness, which is very encouraging*

- **OK Card System; Competency of QC Engineers; QC Tests** OK card system has been meticulously introduced on the work of raising & strengthening of this tank bund.

The mission had detailed inter-action with Assistant Executive Engineer, Quality control (Mrs. D. Malarvizhi) and Assistant Engineer (Mr. N. Karthigai Balan) and found them to be very enthusiastic and competent in the quality control testing procedures and are capable of conducting the tests themselves. Their filling of OK cards relating to this tank bund as well as the ones relating to the reconstruction cum

repairs of 2 weirs in this tank system and recording of remarks relevant to the specific sub-activities was observed to be good. In response to the mission suggestion to conduct the “density test” of the compacted layer, they conducted the test through “core cutter method” and determined the moisture content through “Rapid Moisture Meter”. The test result indicated compaction efficiency of compacted layer to be 98 % Proctor density against the specified 95 %, thereby, signifying good work done.

The mission also perused the quality control tests conducted by them on the various “inputs” (sand, aggregate, concrete) relating to the reconstruction / repairs of 2 weirs being under taken in this tank. It was particularly satisfying to note that the initially adopted W/C ratio of 0.75 in the concrete mixes by the contractor was subsequently got reduced to 0.60. This effort was a step in the right direction.

The Mission appreciates the enthusiasm and capability of both Mrs. D. Malarvizhi, AEE and Mr. N. Karthigai Balan, AE, Quality control.

- **Quality Control Training** The mission was apprised that on receipt of additional quality control testing equipment during April, 2010, both the above AEE and AE Quality Control conducted training sessions during May, 2010 in each Division of Madurai Region to train the engineers on the operation of rapid moisture meters. This is appreciated.

F. Senkottaiyar Sub-basin – Madurai Region

7. Rehabilitation and Modernization of Non System Tanks in Senkottaiyar Sub-basin, Aruppukottai, Sathur & Virudhunagar Taluk of Virudhunagar District.

Package No. 01/IAMWARM/WRO/SKR/Works/II 2008-09 (Rs.536 Lakhs)

Chettikurichi Smal Tank; Kanmoipatti Tank. The mission visited these tanks and a surplus weir which have reportedly been completed. The works in the package have almost been completed.

Mission Observations and Suggestions.

- The earthfill on sides of tank bunds is still to be adequately consolidated. The Contractor has assured to mobilize and deploy hydraulic excavators with steel plate fixtures attached to the booms for consolidation of earthfill. The contractor had deployed heavy vibratory power roller at Kanmoipatti tank bund for such consolidation but the roller was observed to be not capable to negotiate the 1.5 (H):I(V) slope upto the bund top. The mission showed the photocopy of a particular vibratory roller to the field engineers, MDPU Consultant, and contractor which was capable negotiating such slopes. The contractor may try to go in for such a roller on hire or outright procurement as considered appropriate by him. Alternatively, he should deploy the soil compaction equipment available with him (viz hydraulic excavators fitted with 1.2mx0.75m/1.6mx1.0m steel plate fixtures) for full consolidation of the earthfill on slopes.
- The Irrigation channels off-taking from the 2 sluices being in the swelling black cotton soils, needed measures should be taken while lining these channels in the initial 25m – 50m reach (immediately downstream of each sluice). Such measures include: determination of swelling pressure of soil sample from the Quality Control Laboratory, Madurai; provision of CNS soil (cohesive non swelling Soil) layer on bed & sides of each channel of thickness governed by the extent of soil pressure as per IS 9451:1994; and consolidation of CNS layer prior to placement of cement concrete lining. Lining without the CNS treatment could suffer damages.

- No measuring device had so far been constructed d/s of any of the two sluices. These devices should be provided.
- In respect of the rehabilitated weir, the mission observed the workmanship to be satisfactory. During inter-action with the concerned construction engineer, it was noted that correct procedure had been adopted on the pointing of joints in the masonry body wall viz, raking of joints to 25mm depth, cleaning of joints with water, pointing in 1:3 mortar, and curing of pointing for 3 days.

Perusal of OK Cards indicated that, initially water-cement ratio (W/C) of 0.80 was kept in M20 concrete mix used for the construction of downstream apron. Being very high, the quality control engineer subsequently got it reduced to 0.60 which was a correct intervention from consideration of the “durability” of concrete. Concrete mix of 0.80 W/C ratio becomes porous and is prone to early deterioration. The mission explained to the field engineers the significance of W/C ratio on durability of concrete to enhance their knowledge.

Common to Regions. There may be some tanks in the various regions where the raising & strengthening of earthen bunds was earlier completed without adequately consolidating / compacting the earthfill on sides. Such tank bunds might be suffering from gullies / rain cuts caused by rains. Compaction of earthfill being of paramount importance, the mission re-iterates that the loose earthfill on slopes, associated with gullies / cracks / rain cuts, on all such tank bunds must be got compacted from the concerned construction agencies through deployment of appropriate compaction equipment. Compliance of this vital Action Point should be reported to Engineer-in-Chief, WRD / Project Director, MDPU by the concerned Regional Chief Engineers.

- In addition to compaction of slopes, turfing should be provided on the rear slope of all tank bunds to minimize erosion of earthfill.
- The mission has furnished to Chief Engineer, Madurai Region and to MDPU photocopies of a vibratory roller which has the capability of negotiating 1.5(H):1.0(V) slope. Deployment of such rollers by the construction agencies would help in achieving quick and efficient compaction of earthfill on slopes besides the compaction of earth fill placed in layers on tank bunds. It is suggested that the contractors may be made aware of the availability of such vibratory rollers for possible deployment, being very fast for compaction of earthfill on sides compared to the hydraulic excavators fitted with plate fixtures on the booms.

Annex I b)- Component A: irrigation Infrastructure Rehabilitation works :

Observations on the quality control and quality assurance of some of the packages of IAMWARM works in the Madurai, Trichhi and Chennai region.

- **The tanks which were inspected in Madurai , Trichhi and Chennai region are:-**
- **Nedungudi Pick up weir In Pambar Basin package -II.**
- **Name of Contractor : M/s Siva Swathi Construction.**
- **Date of Start : 17.03.08 Date of Completion : 16.09.2009/
30.06.10**
- **Time Elapsed : 27 Months Time Remaining : nil**
- The rehabilitation work of this project is completed on June 30, 2010. The completion of work has been delayed by about 9 months. The work was inspected by Bank consultant on 23.09.10, It was informed that so far Rs 1050.69 lakh has been incurred against the contract value / RAS cost of Rs. Rs.1118.11 / 1057lakh. The position of the measures taken for not achieving the mile stones was not readily available. The OK Card system was followed. The quality of concrete and the quality of the finished concrete was good and acceptable. However the quality of earth work executed is not to the mark as especially on slopes, the rain cuts were developed all along the dam. The department has managed the quality control activities of the works with their limited resources and by resorting to the out sourcing, the testing of the construction material. The WUA people are involved in construction activities by getting their signature in the OK Card. **The overall performance of work could be classified as marginally satisfactory, the defect liability period is still live and all the defects noticed in the works by close observations should be rectified.**
- **Kanadukathan Kanmoi in Pambar sub-basin package - I,**
- **Name of Contractor : M/s Siva Swathi Construction.**
- **Date of Start : 17.03.08 Date of Completion : 16.09.2009/
30.06.10**
- **Time Elapsed : 27 Months Time Remaining : nil**
- The rehabilitation work of this project is completed on June 30, 2010. The completion of work has been delayed by about 9 months. The work was inspected by Bank consultant on 23.09.10. It was informed that so far Rs 788.00 lakh has been incurred against the RAS / agreement cost of Rs.815.00 / 870.77 lakh. The position of the measures taken for not achieving the mile stones was not readily available. The OK Card system was followed. The quality of concrete and the quality of the finished concrete was good and acceptable. However the quality of earth work executed is not to the mark as especially on slopes, the rain cuts were developed all along the dam. It was reported that the department has managed the quality control activities of the works with their limited resources and by resorting to the out sourcing, the testing of the construction material. The WUA people are involved in construction activities by getting their signature in the OK Card. **The overall performance of work could be classified as marginally satisfactory, the defect liability period is still live and all the defects noticed in the works by close observations should be rectified.**
- **Neppier Urani tank in Agniar sub-basin Package - IV in Phase – II**
- The rehabilitation work of this package having 4 anicuts and 35 tanks project is to be completed on Nov 14, 2010. The completion of work has been delayed. The work was inspected by Bank consultant on 23.09.10. It was informed that, so far, Rs 596.00 lakh has been paid against the agreement cost of

Rs.757.33 lakh. The quality of concrete and the finish of the concrete was good and acceptable. However the quality of earth work executed is not to the mark, as especially on slopes, the rain cuts and are developed all along the dam slopes. The big trees have grown on the slopes of dam. It was reported that the department has managed the quality control activities of the works with their limited resources and by resorting to the out sourcing, the testing of the construction material. The WUA people are involved in construction activities by getting their signature in the OK Card. **The overall performance of work could be classified as marginally satisfactory, the contract is still live and all the defects noticed in the works by close observations should be rectified.**

- **Maligai kulam tank in Ambuliyar basin Phase –II** package -1,
- **Name of Contractor : M/s RPP Construction.**
- **Date of Start : 20.05.09 Date of Completion : 20.11.2010**
- **Time Elapsed : 16 Months Time Remaining : 02 months**
- The rehabilitation work of this project which is having 36 tanks and 4 anicuts, and is to be completed on Nov.19, 2010. The 77.5% work could be completed in 89 % of time so far. The work was inspected by Bank consultant on 23.09.10. It was informed that up to date, Rs 479.00 lakh has been paid against the agreement cost of Rs.670.00 lakh. The package is lagging behind the schedule as on date. The position of the measures taken for not achieving the mile stones was not readily available. The OK Card system was followed. The quality of concrete and the finish of the concrete was good and acceptable. However the quality of earth work executed is not to the mark as especially on slopes, the compaction work was being done by one excavator with the attachment of non vibratory plate which was not effective on the dam slopes. The attachment known as impactor if attached to excavator in place of simple plate will give the desired results of compaction. It was reported that the department has managed the quality control activities of the works with their limited resources and by resorting to the out sourcing, the testing of the construction material. The WUA people are involved in construction activities by getting their signature in the OK Card. The overall performance of work could be classified as marginally satisfactory, and all the defects noticed in the works by close observations should be rectified.
- Kallalangudi Pariya Eri Ambuliyar basin Package -1. This tank is also the part of the package - I described above and position of the contract is same as above. The forest department has grown large number of trees in the reservoir basin of the dam which are likely to be affected when the reservoir is full. The villagers are demanding the deepening of the reservoir so that more water could be stored. However this should not be generally allowed as the impervious cover will be lost and there could be more water loss than the additional storage of water.
- Thanthani Mela Eri in Ambuliyar basin Package II. There are 43 tanks and 5 anicuts in this package 2. The value of the contract is Rs. 662.09 lakh. The agency is Thiru N.Ramchandran. The work of this contract was started on 31.07.09 and is to be completed by 30.01.10. The surplussing arrangement of this dam is complete. There are 5 sluices in this 1700 m. long dam, the repairs to two sluices is to be done The reconstruction of 3 sluices is complete, but the earth work on the dam could not be started as the clearance of the revenue / forest department is awaited for felling of the large number of trees grown on the dam slope. This is to be pursued. As on date about 64.46 % of work costing Rs. 426.76 has been completed.
- Panankulam Periya Eri in Ambuliyar basin is also the part of Package II described above. The 1420 m. long tank has 5 masonry sluices and one waste weir. The three sluices have been reconstructed but repairs to two sluices are to be done. Although the concrete work is good the earth placed in the earth

work of the dam was not cleared of the roots and other overburden materials. This should be got rectified immediately as the work of this dam is in progress under package II The efforts should be made to complete the balance 20% work within the stipulated period.

- Pidagam Periya Eri Varah Nadi Package - 10 The work located in Varah Nadi is awarded to one M/S SRM Construction on 09.10.09. and is to be completed on 08.04.11. The work is in progress and about 50% work has been reported to be completed. The quality of the pucca work is good but the earth work quality is not to the mark.
- Senganthangal Tank Varah nadi Package - 11 (b) The work costing Rs. 79.71 lakh is awarded to one M/S Narsingham Chengalpattu on 22.10.09 and is to be completed on 21.10.10. The work in progress and about 90% work has been reported to be completed. The quality of the pucca work is good but the earth work quality is not to the mark.
- Melakondai Varah nadi Anicut of package -11 (c) The work costing Rs. 90.61 lakh is awarded to one M/S Pariathambi Gaundar & Co. The work is in progress and work costing about Rs. 71.56 lakh has been reported to be completed. The quality of the pucca work is good but the earth work quality is not to the mark.
- Vidur Main Canal Varah nadi of Package – 09 (a) The work costing Rs. 76.74 lakh is awarded to M/S Rajendran on 15.10.09 and is to be completed on 14.10.10. As on date work worth Rs. 43.72 is reported to have been completed. The canal is lined with masonry from LS 250m to 450m and with concrete from 450m to 1,000 m. the quality of the concrete is good but is to be ascertained by the core testing before the payment of the final bill.

Annex II- Agriculture Marketing and ABDF

1. Setting up of Agri-Business Development Cell: ABDF cell will be created in the office of Commissioner of Agriculture Marketing for supporting various development initiatives under the project. The cell will have four to five agribusiness and finance professionals. Together they will have pooled expertise in formation of producer companies; delivery of business development services to farmers, producer companies and agri-enterprises in the last mile; agri-business linkages with the farmers; feasibility studies for agri-enterprise and value chain development; and appraisal and grant making. These professionals will have 8-10 years experience, with preference to private sector experience. The Cell will directly report to the Commissioner and will have exclusive responsibility for overseeing the second generation investments by the project viz. (i) training and handholding district and state level agriculture marketing staff; (ii) formation of producer companies; (iii) value chain development in key commodities; (iv) development marketplace; and (v) streamlining partnerships (MoUs) with private sector firms. The project agreed to share the organization structure, HR policy, job descriptions (ToRs) for the various roles proposed in the ABDC with the Bank.

2. Consolidating commodity groups into producers' organizations: The nine Agri-Business Centers (ABCs) Phase I sub-basins are operational. The major commodities handled by them include copra, paddy, maize, groundnut, gingelly, chillies, pulses and vegetables. The mission is of the opinion that ABCs can absorb enhanced marketing if current leadership managing the structures is provided systematic business orientation. In order to , consolidate these activities and institutionalize them into viable business entities, the mission recommends consolidation of commodity groups in the command of these ABCs into producers' collectives like producer companies registered under Chapter IX of Companies Act.

While the actual service offering of these producer collectives would depend upon a host of factors including cropping pattern in the local area, land ownership pattern, current of level of technology adoption, state of market development, distance from markets, etc., an illustrative list of services that could be offered by them include: (a) agri-input supply; (b) farm extension & training facility; (c) market information & intelligence; (d) farm advisory services; (e) agri-equipment hiring; (f) agri-equipment repairs and services; (g) soil testing, water testing, fertilizer testing; (h) storage facility; (i) quality control/grading/sorting facilities; (j) packing and transport logistics; (k) trade facilitation; (l) contractual supply and buy back arrangements; and (m) financial services.

These companies would target well functioning ABCs and specialize around one of two key value chains (like maize, chillies, fruits and vegetables, dairy etc.). About 10 producer organizations, involving 5000 farmers, are expected to be created under this initiative. The mission advises the project to develop a detailed road map/guidelines along with a comprehensive capacity building plan for forming producer companies articulating (i) purpose and objectives of producer companies; (ii) steps in producer company formation; (iii) products and service offering; (iv) business model; (v) membership norms; (vi) structure and functions of basic governance structures (including office bearers and sub-committees); (vii) business processes; (viii) housekeeping and secretarial mechanisms; and (ix) financial management, fiduciary assurance and disclosure mechanisms; etc. Considering the absence of relevant skills within the department, the mission recommends hiring of two or three resource agencies for forming and systematic capacity nurturing producers' organization. The project will share the ToRs for the resource agency and the DPR for the initiative.

Initially the project will support ABCs with small value addition equipment and machineries (for US\$ 10000 each) to kick start the collectivization process. The second tranche of infrastructural support will be provided to each producer company based on their business plan which is expected to be developed after about a year of intensive capacity building of the producer companies.

3. Value chain development in select commodities: Sequel to the infrastructure centric initiatives, the mission encourages the project to focus on strengthening two or three value chains that are of strategic importance. *The project agreed to commission the value chain study for key commodities which will provide valuable insights to develop this initiative.* While emphasizing on linking farmers with markets, the value chain development efforts will aim at creating and preserving value through quality addition, improved post harvest handling, output aggregation and agro-processing in producer end of the chain. It will also secure upstream and downstream links for farm holders in each of the value chains by engaging agri-entrepreneurs, small and medium enterprises (SMEs) and units in Special Economic Zones. International experience demonstrates that such initiatives when taken in partnership with lead firms in the value chain deliver optimal impacts. The mission suggest the project to either partner with lead firm or hire a technical support agency to support conceptualizing as well as implementing the value chain development initiative. While private good element of the proposal (investments in processing units, logistic services, etc.) will funded from commercial sources like commercial banks, SFAC, etc, the project will primarily invest in public goods such as capacity building on good agricultural practices (GAP); putting in place traceability systems, HACCP protocol; promoting compliance to food safety and standards; filling in critical supply chain infrastructure gap (on viability gap funding basis or otherwise). The project will share the ToRs for the technical support agency and the DPR for the initiative.

4. Development market place for linking farmers with markets: The mission appreciates the efforts of the project in linking farmers with markets. More recently the project has entered into an arrangement with Tamil Nadu Agricultural Marketing Federation (TANFED) for procuring pulses under its Minimum Support Price (MSP) operation (by DD, Pudukottai). Besides engaging these firms to build long term relationship, there is also a need to expand the scope of collaboration beyond the realm of agri-marketing. Typically such partnerships could be built with input-providers, technology and agri-service firms, large buyers, processors and retail chains. A beginning has been made by the project in this direction by collaborating with M/s Tata Sons Ltd under National Pulses Mission. In order to identify alternate business models for linking farmers' organizations, SMEs with agri-businesses engaged in farm research, technology extension, input supply-service provisioning, processing, retail and exports from public, private and NGO sectors. The project agreed to organize a 'Development Marketplace' dedicatedly for agri-business sector in March 2011 . The marketplace will provide platform for showcasing and celebrating the best practices across the country in linking farmers with markets. Targeted effort will be made to attract the private and civil society sectors, which have already invested or have plans to invest in Tamil Nadu. This will be followed up by a round table with the best practitioners for a structured dialogue to enter into productive partnerships. In order to accomplish this, the project agreed to hire the services of reputed agency, bank or consulting firm having expertise and track record in agri-business consulting and advisory services for technical back stopping. This would include support for developing guidelines for productive partnerships, call for proposals for market place, developing evaluation criteria, screening of proposals, constitution of expert committee, secretarial support for marketplace and event management. The project agreed to share the ToRs and organization profiles of the prospective technical agency for the Bank's approval.

5. *Other Initiatives:* CAM has taken several measures in collaboration with TNAU, Nokia and Reuters to strengthen the market intelligence systems and disseminate market information to farmers in project areas. Building on these initiatives the project agreed to develop and pilot multi-media (touch screen) and mobile based applications for agriculture marketing.