

April 10, 2008

Mr. L.K. Tripathy
Chief Secretary
Government of Tamil Nadu
Fort St. George, Chennai, Tamil Nadu, India

Dear Mr. Tripathy:

**Tamil Nadu Irrigated Agriculture Modernization and Water-Bodies Restoration and Management
(IAMWARM) Project**

I would like to thank you and your colleagues from the various departments and implementing agencies for the constructive discussions with the Bank implementation support mission (February 4-13, 2008) for the Tamil Nadu IAMWARM project. The mission's key recommendations and the agreements reached during the wrap up meeting held on February 13, 2008, which you chaired, are highlighted in the attached *aide memoire*.

The mission informs me that the project has started to make good progress on the implementation of first-year plans. I am especially encouraged by the progress on the Water Resources Organization bifurcation, System of Rice Intensification activities, and the progress towards making this project better integrate multi-disciplinary and multi-agency perspectives to provide better convergence of activities for irrigated agriculture and water-bodies management.

I would like to bring the following critical points to your attention:

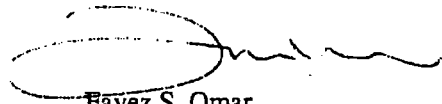
- **SWARMA:** The establishment of the State Water Resources Management Agency (SWARMA) will be essential for the improved management of water resources in the state. Thus it will be important to accelerate progress on this activity, particularly that the legislation for SWARMA establishment will be finalized by May 2008 and submitted for approval.
- **Project cells:** There continues to be slow progress in establishing and fully staffing the three WRO cells (Participatory Irrigation Management, Training, and Information Technology) and the environmental cells. These cells are essential for institutional building, capacity strengthening, and the implementation of major activities under the project, particularly the formation of water users associations (WUAs), and in promoting sustainability of investments and undertaking environment-related work. The mission informs me that agreements were reached to finalize the staffing of the WRO cells and the remaining project cells with suitably qualified individuals by March 31, 2008.
- **Project consultancies and other procurement issues:** A number of consultancy assignments under the project have still not been commissioned. These include: Monitoring and Evaluation, Third Party Technical Supervision, Internal Audit, Enterprise Management Information Systems, Support Organizations for Mobilization and Capacity building of WUAs, Value Chain Analysis, Topographic and Cadastral survey, Basin Planning and Decision Support Systems. In addition procurement of computers for WRO has also been pending for some time. To ensure a coherent implementation of the project, it is crucial that the above services and goods are brought on board as soon as possible, particularly as the bulk of the first year program is getting under way and the second year development plans are being finalized.

- Many of the above issues, when addressed, would also contribute to the main elements of the Governance and Accountability Action plan¹ (GAAP) developed under the project. For instance, the rapid formation of the WUAs would provide for a wider civil society involvement in the planning, preparation, implementation, and monitoring of project activities, particularly construction works.
- It is equally important for the project to incorporate the lessons learned from the first year procurement problem related to the high prices of bids received for WRO works. As you know, the Bank had granted a one time exception for the GoTN to negotiate with the contractors following the agreement reached between us in November 2007. However, in the future, bids should be invited based on more realistic estimates to avoid facing a similar situation.

Thank you for your attention and close monitoring of this important project and I continue to rely on your support and leadership to ensure that the issues raised above are urgently addressed. I am confident that the hard work of both the GoTN and the Bank team will help this project to continue on the right track. Please do not hesitate to contact Rabih Karaky, The task team leader, for any questions or clarifications on this letter or the attached aide memoire.

With regards,

Yours sincerely,



Fayez S. Omar
Senior Manager, India Program
and Acting Country Director, India

Attachment: *Aide Memoire*

¹ Referred to as Transparency and Accountability Plan in the PAD

cc: Mr. Madhusudhan Prasad, Joint Secretary (FB), Department of Economic Affairs, GoI
Mr. Prashant, Director (FB), Department of Economic Affairs, GoI
Ms. U.N. Panjiar, Secretary, Ministry of Water Resources, GoI
Mr. S. Manoharan, Additional Secretary, Ministry of Water Resources, GoI
Mr. L. Rynjah, Advisor, (WR) Planning Commission, GoI

Mr. Rajeretinam, Secretary to Chief Minister, GoTN
Mr. Audseshiah, Secretary, Public Works Department, GoTN
Mr. Gnanadesikan, Secretary, Finance, GoTN
Mr. Surjit Choudhry, Secretary, Agriculture, GoTN
Ms. Leena Nair, Secretary, Animal Husbandry and Fisheries, GoTN
Mr. Vibhu Nayar, Project Director, IAMWARM Project
Mr. Muniasamy, Engineer-in-Chief, Water resources Organization, GoTN

Aide-Memoire
Tamil Nadu Irrigated Agriculture Modernization and Water-bodies restoration and
Management project
Implementation support/Supervision mission
February 4-13, 2008

Introduction

A World Bank supervision mission¹ visited Tamil Nadu during Feb 4-13, 2008 to review the implementation progress of the TNIAMWARM project. The mission initiated its work with a series of meetings with MDPU and the Head of Departments (HODs) of the different implementing agencies. It then proceeded to visit the following sub basins: Varahanadhi, South Vellar, Pambar, Manimuthar, Kottakarayar, Arjunandhi, Aliyar and Palar to interact with the staff at the sub basin/district level and get a closer look at the implemented project activities. The mission would like to convey its sincere gratitude and appreciation to all line departments, MDPU and WRO personnel for their hospitality and their time and efforts in facilitating its work by providing all information requested, and organizing field visits.

Overall, the mission is pleased with the good progress that has been achieved to date under the project. The mission appreciates the time and effort spent by all implementing agencies and by MDPU in making this happen. In this respect the mission commends the leadership and full engagement of the project director and the HODs in advancing project implementation and enhancing cooperation among the different implementing agencies.

This Aide memoire summarizes the findings and recommendations of the mission. Actions agreed are as of the end of the mission.

I. Key Issues

| Project Data | | Current Ratings and Flag | | |
|-----------------------------|--------------------------|---------------------------------|-------------|-------------|
| | | <i>Summary Ratings</i> | <i>Last</i> | <i>Now</i> |
| <i>Board Approval Date</i> | <i>01/23/2007</i> | <i>Development Objectives</i> | <i>s</i> | <i>s</i> |
| <i>Effectiveness Date</i> | <i>04/09/2007</i> | <i>Implementation Progress</i> | <i>s</i> | <i>s</i> |
| <i>Closing Date</i> | <i>03/31/2013</i> | <i>Project flags</i> | <i>None</i> | <i>None</i> |
| <i>Original Loan Amount</i> | <i>US\$485 million</i> | | | |
| <i>Amount Disbursed</i> | <i>US\$25.38 million</i> | | | |

¹ The mission consisted of Rabih Karaky (Team Leader), Srinivasan Raj Rajagopal, (Water Resources Specialist), Joop Stoutjesdijk (Lead Water Resources Specialist), Nagaraja Rao Harshadeep, (Sr. Environmental Specialist), Shankar Narayanan (Sr. Social Development Specialist), Santhanam Krishnan (Sr. Procurement Specialist), Anand Srivastava (Procurement specialist), Elliot Mghenyi (Economist), Anupam Joshi (Environmental Specialist), Jagdish Anand, (IT Specialist), B.S. Sathe (Livestock specialist), Sitaramachandra Machiraju (Agribusiness specialist), Inder Abrol (Agricultural specialist). Mohan Gopalakrishnan (Sr. Financial management specialist) visited the project in early March 2008 to look at financial management issues.

1. **Bifurcation of the Public Works Department and Formation of a specialized Water Resources Department:** The mission was advised by the Secretary, Public Works Department on February 4, 2008 that the processing of the administrative approvals required for bifurcation has been completed and the Government Order and Gazette notification would be issued shortly. Given that this is a dated covenant in the legal agreement and is already substantially past due, the mission requests that the notification be speeded up. The mission would appreciate receiving a copy of the final notification with all annexures for filing in the Bank's legal records ensuring complete compliance with the covenant. Until this is done, the covenant will be considered to be under non-compliance status. It was agreed at the wrap-up meeting that such notification would be done by February 15, 2008 and documentation made available to the Bank by February 20, 2008. *Update: The mission has received a copy of the Government Order in Tamil, and has requested that an English copy be forwarded to the World Bank by March 31, 2008.*
2. **Project Cells** The mission is pleased to learn that a significant restructuring has taken place within the department of agriculture by reallocating officers to the horticulture and agriculture marketing departments, which were suffering from serious staff shortages. The mission congratulates the GoTN on this forward looking action and hopes that this move will give the much anticipated boost to project cells to speed up project implementation among the three line departments.
3. **WRO cells** The mission is concerned that very little progress has been achieved in the staffing of the WRO cells (PIM, Training, and IT cells), despite the agreement reached during last mission that the cells will be fully operational and functional by Oct 31, 2007. This delay represents a serious obstacle to the implementation of key institutional and capacity building activities under the project. The mission urges the GoTN to take the necessary action to rectify this situation as soon as possible and to inform the Bank of the progress on this issue as it constitutes a legal covenant under the project. It was agreed that all WRO cells will be fully staffed and functional by March 31, 2008
4. **The PIM cell and WUAs** PIM cell has not yet been properly staffed as per requirement either at Engineer in Chief office or at the 4 Regional Chief Engineer offices. Around 2500 WUAs are to be formed as per the TNFMIS Act in the project area. Of these around 125 WUAs already exist in the 2 sub-basins of Palar and Aliyar in Pollachi region. The process of formation of the remaining 2375 WUAs involves delineation of the command area and territorial constituencies of each WUA, preparing the list of farmers with survey no.'s, getting this cross-checked with the revenue department before finalizing electoral rolls that would be the basis of WUA elections to be conducted by the District Collector in each of the project districts. The PIM Cell at State level is responsible for this activity and should be fully functional and operational to undertake this task.
5. **The training cell** has not been staffed with the required personnel. The top two positions of Executive Engineer and Assistant Executive Engineer are yet to be filled. There is also a vacant position each for Assistant Engineer, Typist, and Office Assistant. Overall, only one position of Assistant Engineer was filled in mid November 2007.
6. There is a need to strengthen and position the staff at the **IT Cell**. The first step in this direction has been taken by positioning a full time EE, 1AEE, and 2 AEs in the office of EinC. Sanction has been also accorded to position an SE equivalent Specialist from the industry; although the incumbent is yet to be selected and positioned. This team needs to be substantially augmented at the field levels (CEs and Project Divisions offices) as also in the

office of EinC with adequate support staff. It is important to note that WRO is required to position a counterpart team to work with the Consultants on EIMS, and therefore, action in this respect needs to be taken before the Consultants come on board.

7. **State Water Resources Management Agency (Authority) SWaRMA Legislation** The mission was informed that the specific constitution of SWARMA as an agency or an authority is under discussion. The mission learnt that a consultative meeting with the WRO Chief Engineers was planned for mid-month to resolve this issue. An early resolution of this issue is warranted since the setting up and operationalizing SWaRMA based on an Act of the Government of Tamil Nadu (GoTN) is a legal requirement under this project and action to comply with this covenant is already overdue. It was agreed during the wrap-up meeting that the Secretary Public Works Department would continue his proactive role in completing the draft legislation by May 2008 and submitting it for approval at the appropriate level. It was further agreed that the SWaRMA would be set up and made operational following the guidelines provided in the Project Appraisal Document.

The mission also visited IWS and the State Surface and Groundwater Data Center with the respective Chief Engineers (IWS and Groundwater) and discussed ways in which their role in the IAMWARM project could be enhanced while waiting for the SWaRMA to be officially formed. In particular, the IWS needed to develop sub-basin atlases for all IAMWARM project sub-basins to facilitate project activity planning and monitoring. The mission also had detailed discussions on the need for and outline of the Basin Planning and Decision Support Systems Consultancy proposed and agreed to assist the IWS with the Terms of Reference over the next few weeks. The mission also recommended that IWS work closely with the MDPU to build a shared GIS planning and monitoring platform.

8. **Water Resources Research Fund (WRRF):** In addition, the mission stresses the need to immediately augment the existing Water Resources Research Fund with the funds allocated for this under the IAMWARM project and reconstitute the advisory panel, if needed and initiate a systematic search for prioritized research topics to be advertised. It was agreed that the reconstituted advisory panel would be in place to reactivate activities under the WRRF by March 31, 2008 and that the funds for WRRF are provided right afterwards.
9. **Irrigation Research Fund** The mission also briefly discussed the Irrigation Research Fund activation with the MDPU. There was a need to identify a suitable location (e.g. the Training cell at the Engineer-in-Chief's office) to manage this fund. The mission agreed with GoTN that the fund would be managed in a manner similar to the Water Resources Research Fund. The topics for irrigation research would be solicited both from within the WRO as well as from a wide range of stakeholders (through newspaper and website advertisements). A prioritized list of shortlisted topics would then be advertised for proposals to be submitted by any interested party for consideration and selection by an Irrigation Research Panel. Some of the initial areas for research identified include alternative canal lining materials and techniques, modern dam safety measures, automatic controls and instrumentation, developing simple interactive tools and decision support systems for irrigation systems management, and other irrigation related issues. During the wrap-up meeting it was agreed that the IRF advisory body would be set up by the Secretary Public Works Department by April 30, 2008 and may include representatives (one each) from irrigation equipment manufacturers (solar energy, automation, etc), academia (university, engineering college) eminent engineer from civil society interested in modernizing irrigation infrastructure and technologies in the State, Engineer-in-Chief of the newly created specialized Water Resources Department and Secretary to Government.

10. **Cooum Sub-Basin** Work on the Cooum is not progressing satisfactorily. This task requires a multi-disciplinary approach. Preliminary analyses indicates that a solution to Cooum problem would comprise interventions in the area of fisheries, aeration equipment, automated regulation structures to use the tides effectively, rural water use efficiency improvements resulting in the possibility of improved ecological flows in the river creating an enabling environment for the fish to survive and act as cleaning agents, removal and prevention of further solid-waste dumping, awareness campaigns in the city and other structural and non-structural measures.

The mission was informed of experiments that the fisheries department had conducted on how long fish would survive at different dilutions of the Cooum river water. The mission recommended additional experiments with aeration as well as ensuring full water quality testing of the water and fish. In this regard, the mission facilitated an interaction of the fisheries specialists (from the department and university) to the State Surface and Groundwater Data Center to visit their highly-acclaimed Level II+ water quality laboratory. The CE Groundwater and his team have assured the team full cooperation in assisting with this effort through the water and fish testing for basic, heavy metals, and pesticides. It was agreed that actions suggested by the Bank team would be completed by March 31, 2008 and given the multi-disciplinary nature of the probable solutions an experienced nodal officer be appointed to coordinate this work by March 1, 2008 either under the Project Director or the Secretary, Public Works. The Bank mission also informed MDPU that it would seek additional financing to bring additional specialists as part of a special mission in the next few months to focus on the Cooum – to outline opportunities to be pursued in the upstream rural catchment, peri-urban and urban areas, and mouth area.

11. **Other Project Management issues- GIS:** The mission was informed about the recent recruitment of a GIS specialist who has done useful work locating project physical activities in two pilot sub-basins. The mission recommended that this be scaled-up quickly to all the first year sub-basins to facilitate synoptic monitoring, and to the second- and subsequent-year sub-basins (integrating IWS sub-basin map information) to both help planning and monitoring. The mission also suggested that selected second-year sub-basin teams present proposed activities for discussion at MDPU using spatial tools such as GIS and Google Earth as has been demonstrated earlier. In particular, the mission suggested that the GIS platform being developed be used as a systematic way of monitoring key project activities (first at sub-basin level, and then at block and village levels) and agreed monitoring indicators while waiting for the M&E Consultant to be recruited. The mission suggests that MDPU facilitate this work through additional contract staff, training, software/ hardware/ connectivity upgrades as necessary.

II. Procurement

Mission reviewed the status of the Procurement with GOTN and an agreed action plan was prepared as per the details below:

1. The major procurement planned for the first 18 months indicated in the PAD were reviewed. PD agreed to provide the current status of these packages and propose updates to be reviewed by the Bank. The mission also informed that responses in future to procurement requests and clearances will be expedited from the Bank side.

2. The bulk of the Procurement under the Project relates to rehabilitation of tanks and is to be executed by the WRO. The bid prices received by WRO for the first year works were considered high. The GoTN requested the Bank to allow them to negotiate with the contractors. Following the agreement reached between GoTN and the Bank on this matter in November 2007, and based on further clarifications requested by the Bank and received from GoTN regarding the implementation of the agreement, the Bank has issued no objections to these packages.
3. Normally, the post review cases would be subject to review subsequently as a part of the ex – post audit process. However, because price negotiations were permitted on exceptional basis, the mission requested that the project sends to the Bank the excise duty forms for all post review cases of WRO where price has been negotiated, event though work may have started on these packages. The mission reiterated that negotiations would not be permitted in future. The main reason for the high rates as also the poor response were the reliance on old estimates as well as the spurt in prices of the inputs like cement, steel and labor etc. Mission suggested that future bids should be invited on the realistic estimates based on the revised SOR to include all the relevant factors, particularly
 - the overheads
 - profit for contractors
 - All applicable taxes and levies etc..
 - Updated current market rates of inputs (both material and labour), including cement, steel, bricks, sand, stone chips/ballast, and other relevant materials etc. as applicable for the item
 - The BoQ should be reviewed to ensure greater accuracy.

The mission also suggested that Price adjustment clauses may be provided in contracts exceeding 6 months to mitigate risks related to volatility of prices of inputs to contractors, as is being done in other states -AP.

4. Capacity building of procurement teams of line departments and WRO. Mission agreed that 5 procurement workshops to train Project staff can be organized from March 2008.
5. Procurement status of all the line departments was also discussed with the concerned Departmental representatives and next steps were identified. Some common issues needing attention were highlighted. These relate to the need for incorporating broad based specifications and determining the market availability in the case of NCBs. In exceptional cases where the items have not been regularly procured in the country in large quantities, the client should suitably modify the qualification criteria. Some departments need to improve their formatting. In case it was felt that rates obtained in any bid for civil works was considered high and re-bidding envisaged, Mission advised that the cost break up should be obtained from the contractor first and only after the department's analysis of the same confirms that the rates are indeed high, the same can be proposed to the Bank for re-bid.
6. TNAU package for procurement of Drip irrigation system was reviewed at the request of the Project. Bank had suggested that the bid recommendation should be reviewed as the recommended bidder submitted the Bid security for period less than that prescribed in the Bid document. This issue was also explained to APC-cum-Secretary Agriculture.
7. *Computer equipment and installation of communication infrastructure* Procurement related to Computers and Peripherals, Computer Furniture, as well as the Procurement of LANs and WAN in the offices of WRO are still to be acted on; the NOC by the WB was given several

months ago. One of the covenants applicable to project implementation stipulates that installation and testing of computer equipment and communication infrastructure in WRO's offices shall take place no later than December 31, 2008.

III Financial Management

1. The progress on the financial management actions is considered satisfactory. The actions completed since the previous mission include: (a) fully staffing the finance unit within the MDPU which now consists of 4 officers/ staff supporting the Finance specialist; (b) consent from the Local Fund Auditor for audit of TN Agricultural University (TNAU) as per TOR approved by the Bank (c) submission of the IFRs for the quarter ended June and September 2008 and (d) designation of a DDO within the MDPU such that it is not dependent on the WRO for its fund drawal and payments. The IFR for the quarter ended December 31, 2008 was reviewed by the Bank. The same will be submitted to the Bank after incorporating the following corrections (i) applying a reimbursement percentage of 90% as against 100%; (ii) applying consistently the definition of tanks and non-tank expenditures after receiving clarification from the Bank. The mission also met with the Deputy Accountant General (Accounts & Entitlement), who confirmed the ability to share monthly project expenditure (by project budget codes) as accounted in the AG's accounting system. This will facilitate reconciliation as well as identifying differences in the expenditure reported by the line departments. There has been a delay in the appointment of internal auditors due to non clearance of the EOI by the Bank. It was agreed that the Bank will respond by March 22nd 2008.
2. During the mission two workshops (Chennai & Trichy) were held on financial management and procurement for the finance and accounts staff of phase- I sub basins in which approx 110 finance staff participated. The feedback was positive. It is suggested (i) that similar workshops be held for the staff from the 13 sub-basins which are to participate in the second year of the project, which could also include a session on an overview of the project and team building exercises and (ii) the list of questions and responses be developed into a frequently asked questionnaire and circulated to all sub -basin accounts staff. A few departments indicated the need to enhance administrative and financial delegation from district staff. As the Finance Departments has already agreed to this, it is suggested that line departments review the current delegation and seek enhancement as appropriate from finance dept.
3. The mission was informed that GoI has not released to GoTN the grant component as its contribution against IDA fund releases. It is suggested that the GoTN follows this up with GoI

IV Consultancies

1. Monitoring and Evaluation: With project activities already under implementation, it is essential that the contracting of the Monitoring and evaluation consultancy is finalized immediately. Valuable time has been lost on interpreting Bank procurement guidelines related to the eligibility of firms for short listing. The mission was promised an update on the status of this consultancy by the end of the current visit, as a project covenant related to the M&E has not yet been complied with. It is noted that a baseline data has been provided by the project. It was agreed that MDPU would respond to the Bank's query on RFP for engaging the Consultancy services for Monitoring and Evaluation by February 15, 2008. Update: MDPU has sent its response and the Bank has reviewed

and responded. MDPU is requested to revise the short list according to Bank guidelines and forward to the World Bank for clearance.

2. Third party technical examination of works: One of the key findings stemming from the field visits to WRO executed works is the importance of having the third party technical examination in place to monitor and ensure the quality of implementation. The Bank was informed back in December 07 that the Engineer in Chief is taking action to issue the Administrative sanction for this consultancy. The mission stresses that the recruitment of consultants should be completed without further delays so that the consultants can be in place when the implementation of the bulk of the first-year program starts and urges the Engineer in chief to take all necessary measure to speed up the process and to publish the EOI by March 31, 2008.
3. Topographic and Cadastral Survey: The Bank has given the NOC to the short list and provided comments on the RFP. The GoTN has since revised the document and forwarded back to the Bank for no objection, which will be issued shortly.
4. Enterprise Management Information Systems: The mission suggests that the EOI for this work be cleared with the Bank and published immediately. In the meantime, the mission has provided the necessary assistance and technical clarity for MDPU to complete the RFP to ensure that the scope of work is clear to prospective consultants. Upon finalization by MDPU, this should be sent to the Bank for NOC.
5. Building: The EOI/TOR & RFP for the Architect for the new building was discussed with the Mission. GOTN confirmed that these documents would be submitted to Bank by Feb 28, 2008. *Update: EOI for the Architect consultancy has been forwarded to the Bank for review. Bank has responded with comments for MDPU to revise.*
6. Support Organization for the mobilization and capacity building of WUAs

GOTN confirmed the following schedule for hiring support organization to help WRO and other line departments undertake the task of community mobilization and capacity building of WUAs and Commodity Interest groups for which specific Terms of Reference were worked out in the August 2007 Implementation Support Mission:

- o Publication of EOIs: 28 February 2008
- o Commencement of works by supporting organization (after short-listing, selection and deployment to the sub-basins): June 07,2008

V Environment issues

Discussions were held to identify critical next steps and streamline the process for consolidating the role of Environment Cell and making it more effective.

The mission noted that many of the project activities (e.g. SRI, IPM, INM) indicated substantial potential environmental benefits to the State. The mission agreed with MDPU that it was important to also focus attention to better manage environmental and social safeguard issues into the sub-basin plans, as well as implementation of the project Environmental and Social Assessment (ESA) recommendations.

In particular, the mission agreed that:

1. **An environmental specialist would be recruited at MDPU (by May, 2008) to facilitate implementation of the ESA, finally appraise sub-basin plans from an**

environmental perspective (with appropriate checklists for each sub-basin/package) with input from the respective environment cells, visualize environmental data in the project GIS, facilitate relevant awareness-building and training activities, and to undertake consolidated monitoring and reporting on environmental aspects across implementation agencies.

2. **The WRO Environmental Cells need to be immediately re-oriented** to take a more central role in the incorporation of outcome-oriented environmental activities into the sub-basin plans – the mission discussed that these were currently generally not strategic or specific to the sub-basin. The mission stressed that this should be focused not only on enhancing potential positive impacts but also ensuring that adverse negative impacts were avoided or mitigated. The Cells should also ensure that the horticulture/agriculture activities proposed in sub-basins include appropriate IPM/INM recommendations. The mission indicated that the monitoring proposed should be customized to each sub-basin needs, and should also include agro-chemical monitoring that could be conducted with the WRO Water Quality Labs. The Cells should also ensure that the provisions of the relevant state laws (for example on river-bed sand mining) are complied with during IAMWARM implementation. *It was agreed that a workshop would be held by May 1, 2008 to help the Environment Cells develop a shared vision of their future under the IAMWARM project.*
3. The mission also recommended that action be taken (by May, 2008) on the ESA recommendation of **appointing an SE (Environment) in the CEPF office** to effectively coordinate the various Environmental Cells headed by Executive Engineers.

VI Governance & Accountability Action Plan² (GAAP): The GAAP plan as agreed under the project, and included in the PAD features the following key elements: (a) enhance disclosure of information, (b) facilitate civil society involvement; (c) Develop a credible system to handle comments, suggestion, and governance, (d) define clearly incentives and remedies available, and (e) Develop monitoring indicators for compliance with the above elements and for impact on outcomes. The Bank team will continue to work with the GoTN to address the key elements of the GAAP plan, particularly as the bulk of first year civil works gets under way and second year plans are being finalized. In this respect, the rapid formation of WUAs and their wider participation in monitoring construction works, along with the accelerated engagement of key consultancies such as M&E, MIS, support organizations, and third party technical quality supervision of works will contribute to the main elements of the plan.

VII Review of second year sub basin plans

The mission made significant progress in reviewing the second year start sub-basin development plans of all line departments. Detailed comments were provided to all implementing agencies to revise the plans and resubmit to the Bank for further review and clearance. The key issue here is to ensure convergence and complementarity of activities among the different implementing agencies within the integrated framework of the project. Furthermore, the mission emphasized that the revised sub basin plans should be vetted by the HODs and by MDPU for quality and completion before sending to the Bank. The Government requested that the Bank expedite the processing of these documents, once received.

² Referred to as Transparency and Accountability Plan in the PAD

VIII Review of project implementation

As noted earlier, there has been good overall progress in the implementation of project activities across most implementing agencies. The mission commends the GOTN and the project authorities for their serious commitment and engagement in accelerating the implementation of project activities. Naturally, given the size and scope of the project, there are areas in need of further improvement that the mission has identified during field visits and that it would like to work together with the project authorities on addressing them. These points are presented below.

- a. Though there has been some delay in the on-start of WRO works due to procurement problems, activities under the different line department have taken off. In the future years the focus should be on converging activities of WRO and line departments spatially and conceptually together to improve the productivity of the surface water delivered in conjunction with ground water.
- b. The mission undertook field visits to review implementation of project activities in the following first year sub basins: Varahanadhi, South Vellar, Pambar, Manimuthar, Kottakaryar, Arjunanadhi, Aliyar and Palar. In addition to field visits, meetings were also convened, at the district level, by district collectors for the mission to interact with all line department officers involved in project implementation. For this purpose meetings were held in Coimbatore (Aliayar and Palar –PAP- sub basins), Puddokotai (South Vellar, Pambar sub basins), and Singavana (Manimuthar and Kottakariyar sub basins)
- c. While very good performance was observed in the PAP sub basins in PAP, there is a need to improve convergence among implementing agencies in the Sivaganga district.
- d. The mission stressed that the amount of subsidy provided for all activities under the project should be the same as that provided for same activities under the existing government schemes. While this is being followed in the case of horticulture crops by adopting the National Horticulture mission rates, there appears to be some differences in activities related to other line departments (e.g. the case of maize and SRI for agriculture dept and TNAU, and the FFDA scheme for aquaculture in farm ponds sponsored by GOI, and others).
- e. The mission requested that all project activities for all line departments proposed under second year sub basin plans include a comparative chart showing subsidies (in % and in absolute rupees) received from government schemes and those to be given under the project for similar activities, with a justification provided in case there were a difference between the two. Finally, the mission strongly recommends a gradual phasing out strategy of some of the largest subsidies provided for activities potentially showing good adoption rate by farmers, and a better targeting of the subsidies towards low income farmers.

1. WRO

The following key necessary actions have emerged following the mission visits to the different sites where WRO packages are being implemented.

- a. There is no clear indication in the contracts what the sequence of tank implementation is. Milestones in contracts only refer to quantities to be completed

at certain time intervals, but it does not indicate at what tanks these works have to be carried out.

- b. Supervision of sites needs to be improved and the contractor should be made to work with a clear implementation program with adequate machinery. The mission emphasized that site inspection and quality control be improved with posting of full-time personnel and effective use of WRO testing laboratories.
- c. WRO staff should ensure that the work is undertaken according to specifications. The mission stresses that the recruitment of third party technical supervision consultants should be completed without further delays so that the consultants can be in place by the time the implementation of the bulk of the first-year program gets underway and prior to the commencement of second year program.
- d. Proper scheduling of activities must be ensured to complete the works in the prescribed time and in line with specifications.
- e. Boards displayed at working sites should provide details of the works under execution, the related WUA, target dates for completion etc
- f. Tank bund strengthening should be carried out after proper quality testing of the material is done
- g. Surplus weirs are being reconstructed without review of the hydrology this is an unsatisfactory situation and needs to be corrected.
- h. OK card system should be maintained properly and the signatures of the relevant parties need to be obtained. A WUA representative should also sign the OK card.
- i. Emphasis on proper engineering designs needs to be given.
- j. The mission visited Mithravayal supply channel works in the Pambar sub basin, and was dissatisfied with the poor quality of the construction. A supply channel is supposed to have been rehabilitated but there was no sign of good engineering in the implementation. No compaction of the embankment has been done. Gaping holes have been left in both the embankments and the engineer advised the mission that the work has been completed. The Chief engineer has been advised that unless remedial action is taken to rectify the situation rapidly, the expenditure for this work may not be reimbursed by the Bank. The Chief engineer promised immediate action and to inform the Bank when this takes place.
- k. The mission records its appreciation of the maps produced by the WRO demarcating WUA boundaries, canal reaches for each WUA in the PAP sub basins and recommend that these are adopted across all sub basin
- l. Contractors carrying out the works were interviewed about equipment being used, manpower availability, costs, reasons for their original high bids and subsequent reductions. All contractors noted the large discrepancy between the SOR used by the department and the market prices of key inputs. The mission reiterates the importance of following a proper methodology to update the SOR prior to future biddings.
- m. Encroachment by farmers and Implementation of the Resettlement Framework: GoTN has prepared and submitted a Resettlement Framework as part of the ESA report for the project. This resettlement framework is the agreed basis for dealing with resettlement issues arising from the project either on account of land acquisition or on account of removal of encroachments on account of the project interventions. This is to be implemented by the Resettlement and Rehabilitation cell (or the Land acquisition and Economic Rehabilitation (LAER cell) which was formed in the Secretariat and headed by joint secretary level (LAER officer, as part of the TNWRCP project and has since been disbanded. The mission requests. The mission requests GoTN to re-establish the LAER cell WRO to keep a database, at the tank level, which would include the name of farmers who have encroached,

area encroached, whether project intervention necessitates any encroachment removal. (A format could be worked out with the help of the Sr. Social Development Specialist on the team).

2. Agriculture Engineering

- a. The performance of the AED department under the project needs considerable improvement. Significant funds are allocated to AED under the project, however based on the physical achievement and level of expenditures realized (around 1.8% of the outlay, the lowest among all implementing agencies) it appears that very little activity has taken place. In some of the areas visited, farmers complained that AED had not followed up on their requests for drip installation. The one-time exemption for procurement of DRIP, extended by the Bank, has not been utilized.
- b. The mission visited an excellent pilot undertaken by AED with the assistance of Universal Agro Services, which involves leading canal water into a sump and groundwater of participating waters into the same sump, pumping it through a filter and fertigation system to drippers for coconuts. A simple but effective moisture control device using two copper strips has been set up for each farmer the electrical resistivity/conductivity being measured to indicate moisture depletion. The pumps get automatically switched on and get automatically switched off based on moisture requirements with a cap of about 100 liters per day per tree. The amount of water used is 10% of the canal water delivered and the remaining 90% can be stored in the Thirumoorthy reservoir.

3. Agriculture, Horticulture, TNAU

- a. Large scale demonstration and adoption of SRI technology by the farmers is a significant achievement and the teams carrying out this work are to be congratulated. The technology has the potential to boost paddy productivity which has been stagnating and even declining for some time. There was ample evidence to show that farmers were convinced of the benefits of the technology. In addition to better productivity, SRI is also widely promoted as a water saving technology. Measurement of the water saved has not been scientifically carried out though. The mission discussed this with the Director Water Technology Center in the field. It was agreed that WTC will establish measurement equipments to conduct a water balance investigation in the upcoming demonstration areas so that amount of water saved can be scientifically established.
- b. TNAU has shown very appreciable results in the field in both SRI and diversification to maize. In future years the university should focus more on spreading the concept of resource use efficiency among farmers and better understanding of which technologies or the component are readily/or not accepted by farmers and why and undertake farmer participatory adaptation of new technologies under a range of situations.
- c. In addition to large scale demonstration of crop and individual technologies, the departments of agriculture and horticulture have a role in enabling easier access to seeds / planting material of, particularly, new crops. Amongst others there is

need for greater emphasis on specialized training and exposure of personnel of the departments of agriculture and horticulture to the best of institutions within and out -side TN.

4. Animal Husbandry and Fisheries

Regarding Animal husbandry and fisheries programs the following observations were recorded:

- a. Only 12 SEVG out of a requirement of 50 SEVG were appointed in December 2007 affecting implementation of related programs.
- b. Due to absence of decision on finalizing a responsible agency to procure animal breeding inputs and supply of medicines, the programs of providing infrastructure facilities for animal breeding had not been taken place.
- c. It has been agreed that the quantity of Semi-Auto analyzers and Mastitis Detection kits should be reduced to only 5 Semi-Auto analyzers and 20 Mastitis Detection kits for the entire project period. These may be purchased and placed only in the major Disease Investigation Laboratories in the project area.
- d. The mission has agreed with the DAH that the rates for supply of semen and LN2 should be same for supplies made to the Dept of A.H. and to the TNIAMWARM project.
- e. The mission has advised that records should be kept on actual fodder production, not only on the quantity of fodder slips /fodder seeds supplied to the farmers.
- f. At present the supply of inputs such as fodder slips, fodder seeds, medicines, vaccines, mineral mixtures are provided to the farmers free of cost. The mission recommended that the project introduces a cost recovery mechanism to partially recover some of the cost of these inputs to ensure sustainability of this activity.
- g. On the proposed training of to update the skills of the veterinarians of the department, the mission noted that the fees proposed by TANUVAS for this purpose appear to be high and requested that project authorities look at other nearby universities in adjoining states for lower cost.
- h. The major problem for the fisheries program has to do with poor progress in construction and subsequent handing over of the farm ponds for fish production by the AED to Fisheries Dept who is responsible for stocking them with fish seeds.
- i. The mission will look into the pending bid documents for construction of Fish seed bank. *Update: This was approved by the end of the mission.*
- j. Partial cost recovery should be considered.

5. Agriculture Marketing and Agri-Business

- a. *Staff position:* The mission noted with satisfaction that staff position at Directorate of Agricultural Marketing (DAM) has considerably improved since last mission. But it is also given to understand that number of posts at divisional and block levels still remain vacant. **It is recommended that suitable steps to fill up all vacant posts by the end of June 2008.** Likewise, MDPU may take steps to recruit an Agri-business Consultant for supporting its agri-business initiatives. The mission was informed that project has decided to place 'Marketing Facilitators' (MF) at each sub-basin. **The placement of such facilitators may also be completed by the end of June 2008.**

- b. *Staff trainings:* The mission stressed upon the need for drawing up comprehensive induction training for all newly posted staff. DAM and MDPU may make rapid assessment of training needs of newly placed staff and carefully draw a training curriculum where exposure/field immersion is given on IAMWARM, WUA activities, mobilization and capacity building of commodity groups, community managed agricultural marketing in AP/MP, private sector based agri-business models with embedded agriculture extension services and other private sector led value chain coordination initiatives in agri-commodities and fresh fruits and vegetable sectors. For this the project could consider engaging resource agencies like MANAGE, NIAM, IIMA etc. and ensure completion of training effort by end of September 2008.
- c. *Value chain study:* Given the importance of identifying strategic crop/commodity sub-sectors for making project interventions through rigorous value-chain analysis the project is advised to expedite steps to initiate value chain study by May 2008
- d. *Capacity building of Farmer Groups and WUAs:* EIC, in collaboration with DAM, may initiate steps to develop an elaborate capacity building plan for farmer groups, WUAs and CSOs. The mission advised that stakeholder wise training plans should be developed and resources agencies for backstopping the training effort at sub-basin level need to be identified.
- e. *Agri-business Centers:* The mission appreciates the strategy of setting up Agri-Business Centers (ABCs) in each sub-basin, which will potentially emerge as rural economic hubs. These ABCs will focus on arranging agri-services, agri-inputs, farm information and extension and sale of agricultural produce. DAM/MDPU may engage a consultancy to propose alternate business formats for ABCs by the end of September 2008 after studying different contemporary agribusiness models. The Bank could provide some help if need be in drafting TORs. Consideration could also be given for partnership with existing agri-service firms for the proposed centers. However, such partnerships should be clearly driven by outcomes on service delivery to small and marginal farmers and transparent incentives for private sector players chosen on competitive basis. The project may want to consider piloting Agri-Business Centers during at three locations around prominent markets like Chennai, Coimbatore and Madurai to draw lessons for scale up. Alternative public-private partnership models and more details on the approach to be used are provided in the annex

Agreed Actions

| Action | Timeframe | Responsibility |
|---|--|---------------------------------|
| Staffing of WRO Cells | March 31, 2007 | WRO |
| SWARMA - Act Drafted | May 31, 2008 | WRO, MDPU |
| Streamline procurement (frequent communication to reduce delays, more oversight on procurement documents by agencies and MDPU, quicker Bank response) | Henceforth | MDPU and World Bank |
| Project consultancy services | As specified in the modified procurement plan – after it is revised and cleared by the World Bank. | WRO/MDPU/World Bank |
| Submit IFR for December 31, 2008 after necessary corrections | March 31, 2008 | MDPU |
| Write to the AG (A&E) to obtain monthly financial of project budget lines from AG | March 31, 2008 | MDPU |
| Clarification on Tank and non tank definition | March 22, 2008 | MDPU/ Bank |
| Creation of receipt head from collection from farmers as contribution – Fisheries Dept | | |
| Enhancement of delegation from certain line departments | April 30, 2008 | MDPU/ selected line departments |

Annex I – Mission comments on second year sub-basin plans

1. **Review of WRO Sub-basin Development Plans for the Second Year Start Sub-basins:** Only three plans out of thirteen reviewed were found to be satisfactory. These are Therkar, Upper Gundar and Swethanadhi. The engineers from the three approved basins were requested to help with the other sub-basins. The three sub-basins have provided good information about the WUAs, the consultation process and the rationale for the packages proposed. These should be adopted by the others and reviewed by senior officers of WRO and the MDPU before submitting to the Bank.
2. In the case of Agniyar and Ambuliari, the engineers have been requested to separate area served by the Grand Anicut Canal since this is an interbasin transfer from the Cauvery and to obtain the approval of the Secretary Public Works if these areas are to be included. Otherwise only those tanks and ayacuts pertaining to Agniyar and Ambuliari and their tributaries should be included and the sub-basin development plans suitably amended.
3. **Review of Department of Animal husbandry sub basin Development plans for the Second Year Start Sub-basins** The Department of Animal Husbandry (DAH) GOTN has proposed to take up 15 sub-basins in Phase II of the program. The itemwise physical and financial requirements for each of the 15 subbasins and a model DPR prepared by DAH were scrutinized by me. A meeting of all concerned officers of DAH in the field along with the officers of the Head office of DAH and myself was held in Chennai on 11th February 2008. On the basis of the mission observations of phase I program in some of the sub-basins visited and discussions held during the meeting, required changes and modifications were done and physical/financial program were revised for 15 sub-basins for Phase II for Year 2008. Model DPR and physical and financial requirements for 15 subbasins of Phase II for 3 years were prepared and will be submitted to the Bank for clearance.
4. **Review of Department of Fisheries sub basin Development plans for the Second Year Start Sub-basins** Programs for Fisheries for Phase II starting from 2008-09 were discussed after the field visits were completed for Phase I. Discussions were held with the concerned officers of fisheries disciplines in sub-basins and the Head Office of the IMWARM project and with the Head Office line Departments in the state Departments at Chennai to revise/ modify the DPR and physical and financial programs proposed by them for Phase II sub-basins.
5. It is observed that the schemes of aqua-culture in fish ponds proposed under Phase II are largely concentrated in two sub-basins (200 in Agniyar and 100 ponds in Poiney subbasin). The number of ponds is much less in other sub-basins. The officers of Fisheries Department have mentioned that there is much greater awareness and demand for this program from the farmers and hence high targets have been fixed. The mission agreed with their views subject to the condition that the Department will have to very closely monitor this program in these two basins and adjust accordingly. Furthermore since a large number of fish ponds are to be taken up in the project, there is an urgent need to strengthen the staff of fisheries department for monitoring of field level activities.
6. **Review of Department of Agriculture, TNAU, Horticulture, and AED sub basin Development plans for the Second Year Start Sub-basins.** The activities plans for

the departments of agriculture, TNAU, Horticulture, and AED were reviewed and details comments were provided on model documents, with few sub basin department plans approved (e.g. Horticulture department). For the remaining, the project will revise based on model plans agreed upon, complete and submit to the Bank for final clearance.

7. **Review of Department of Agriculture marketing sub-basin Development Plans for the Second Year Start Sub-basin:** The activity plans for agri-marketing component prepared for each sub-basin were perused. These plans were prepared with three-year perspective. The project has rightly front-ended softer elements of the interventions like group formation, capacity building, etc. in first year and most of infrastructure related investments have been allocated to second and third year. In order to connect the activity plans across the three-year period, it would be useful to build simple outcomes within the first year plan that trigger subsequent investments. This will not only serve gate keeping function for second year activity plan but also adequately incentivises good performing WUAs/farmer groups to collapse the time frame to accomplish project objectives in a shorter time frame.
8. The key interventions proposed in almost all sub-basin plans center around three major commodities viz. paddy, maize and fruits & vegetables. The mission recommends that each sub-basin team identify at least one strategic commodity and initiate value chain coordination with a large buyer, processor or retail chain in their respective area during the first year. Flowing from this logic, it is suggested that at least 50% of the investments in marketing infrastructure like collection centers, godowns and drying yards, etc should be guided by needs of value chain development efforts. The mission is of the opinion that DAM/MDPU should develop standard packages of fixed and movable infrastructure strategic dispersal within the sub-basin in a modular fashion. For instance, a standard module of fixed infrastructure like collection center and storage godown/drying yard located at a central point for a group of villages could serve as a hub while movable infrastructure package comprising tarpaulins, moisture meters and weighing machines is dispersed along strategic points within a defined catchment area of each collection center. For this, there is need to perform reality check of existing infrastructure arrangements on ground and having in place a clear road map for empowering farmer groups to assume management of infrastructure and cost of maintenance within a definite time frame.
9. Given the focus of plans in creating fixed infrastructure in coming years, there is implicit need for converging such investments around market consideration. For instance investments in common facilities like agri-equipment, IT kiosks and collection/marketing centers at convergent place would multiply forces that drive outcomes of the project. It is recommended that the investments in the earlier years be focused on capacity building of farmer groups in product hygiene, post-harvest quality improvement, standardization (grading/sorting) and local level aggregation.
10. *Dialogue with Private Sector:* The mission recommends that the project draw a coherent strategy to engage private sector. In this realm, range of opportunities exists for partnering with large buyers, processors, retail chains and private agri-service firms. These include:
 - i. Private firms making contracted sourcing of agri-commodities from farmers/groups in WUAs

- ii. Private firms engaging farmer groups as quality promotion and procurement agents for agri-commodities in WUA areas
 - iii. Private firms engaging spearhead teams for providing technical assistance & extension support and sourcing produce from farmers
 - iv. Private firms collaborating for improved cropping practices, growing high value crops, local value additions, new product development, etc. for linking producers with export markets
11. The mission was informed about project initiatives in developing partnerships with processing firms particularly for maize and chillies. The mission interacted with one such partner (a large chilly export house) involved in producing high value products from chilly oleoresins and identified opportunities for deepening the engagement. DAM and MDPU may develop an action plan by end of June 2008 for value chain development for chillies (possibly with Non Pesticide Management practices) in Sivagangai, Theni and Virudhunagar areas and formalize marketing arrangements with export houses in the area. It is worthwhile to consider complementing the strategy with a dedicated supply chain infrastructure for chilly farmers in the area. Similar scope exists for optimizing value chain efficiency for maize farmers in Coimbatore area.
12. *Collaboration with CII, NABARD, banks, etc:* The mission recommends initiating dialogue with NABARD, banks and trade organizations like CII, FICCI, FIEO, etc. to identify areas of possible collaboration to support agri-business sector particularly in the realm of access to finance and business development services.

Annex 2- Alternative public-private partnership models that could be considered under the project

1. Public Ownership and Community Management
 - i. **Technical assistance or franchise model:** Under this model, the project would set up Agri-Business Center and WUA/farmer groups manage the center. Private sector firms with experience in delivering agri-services provide technical assistance for a fee and also have franchise arrangement. The model presupposes vibrancy and competency of WUAs/farmer groups to run community enterprises on sound business lines.
2. Public Ownership and Private Management
 - ii. **Management agency model:** This model envisages the project to create infrastructure facilities for Agri-Business Center and allow private partner to manage the center.
 - iii. **Build and Operate model:** Under this model the project will contract the private sector to both, build and operate the Agri-Business Center.
3. Private Ownership and Private Management
 - iv. **Extended Outreach model:** The private sector firms engaged in provision of agri-business services extends its outreach of one of their existing centers to enable WUA/farmer groups to avail their current offering of agri-services.
 - v. **Build, Own and Operate model:** The private partner invests in setting up own infrastructure facility and operates the Agri-Business Center.
4. Joint Ownership and Private Management
 - vi. **Joint Investment Model:** Here, the project and private sector firm could jointly invest in co-developing a comprehensive agri-service facility that integrates technical assistance, agri-input supply, farm extension, value addition marketing information, produce aggregation and agri-marketing.

Annex 3- Suggestions/recommendations for improvement of quality and long-term sustainability of the AH and Fisheries programs:

Animal Husbandry:

1. Establishing a forward linkage for milk production program.

Project office and Line Dept A.H. should establish dialogue with AAVIN / Private sector Dairy for milk marketing for farmers in the project area. A regular meeting at an interval of every six months will be useful.

2. To solve various field level problems, a regular meeting between the MDPU, HOD AH , TANUVAS, TNUVAS and private sector Dairy Industry so that each can contribute to the project with a common objective of solving farmers' problems and making the project self - sustainable in the long run .
3. TANUVAS can be asked to assist the project by suggesting suitable designs of the cattle shed to suit different agro-climatic zones of the state, to guide the farmers on least cost ration formulation utilizing the locally available agricultural farm byproducts and waste material, suggesting suitable fodder trees for different agro-climatic zones of the state and helping the project office/DAHD to put up demonstrations in the project area, solving the large scale problem of infertility of animals in the project area etc.
4. In the beginning, the project office / DAHD should initiate the program in the villages. However, after sometime, it is necessary to identify progressive farmers and leaders from amongst the farmers who will take the program to the next higher level. For example, a larger number of Self Help Groups (SHG) have now been formed with identified group leaders. This infrastructure which is already created in the rural areas can be suitably used for the present project. Alternatively, Water Users' Associations could be encouraged to take the local leadership to develop the need based programs and implement them.
5. The training farmers being organized by DAH are generally satisfactory. However there is a need to focus more on the practical aspects of dairy cattle management and more demonstrations by taking the trainees to the progressive farmers in the area. The focus should be on solving problems of farmers and on new lost cost effective technology which farmers can adopt easily.
6. Improving productivity, reduction of cost and increase in the income of farmer
 - (a) The fodder should be chaffed before feeding to avoid wastage. If farmers are situated nearby to each other, a hand-operated or machine operated chaff cutter can be provided to a group of farmers .Bank credit for chaff cutter is available.
 - (b) The last crop at the end of the fodder cycle can be left out to form the fodder seeds which can be collected, stored and supplied to the farmers during the next season, thus avoiding purchasing the fodder seeds every year from the outside agency. This practice can be adopted on the fodder farms of the DAH.
©The cost of dry fodders like paddy straw or sorghum straw is much less in the season immediately after the main crops are harvested. If necessary, make available working capital or short term credit to the farmers to purchase the fodder during the season and store it for future use in the lean season when the price of straw is very high.
 - (d) In the cattle shed, provide a urine channel to collect cattle urine in a pit which can be constructed and located near the shed. The fodder which is left over by the animal should be removed and placed in the nearby compost pit along with the collected urine to form a high value organic manure which can be used

to get a high fodder yield and improve soil quality. This will also save the expenditure on purchasing inorganic fertilizers.

(e) Farmers should be encouraged to keep proper records on fodder production and utilization, expenditure on feeding, breeding (A.I. and date of calving) health control (medication/ vaccination, mortality) and record of milk production and sale. Suitable cards should be designed and provided to them by the project authorities. HOD A.H.

7. Adoption of Farmer friendly technologies:

Labor costs are going up and in many cases labor is not available. Labour saving and cost-cutting technologies will have to be looked into. For example drip system for growing of fodder crops (cheap and low cost drip system demonstration can be seen at Baramati Pratishthan, Baramati, Maharashtra). Dr Tarak Katey, CEO of "Dhara-Mitra" (NGO) at Wardha, Maharashtra has developed many farmer-friendly low cost technologies to level the land, estimate the contours of land, low cost rain gauge and equipment for land leveling, using cattle urine to supply Nitrogen and as a fungicidal agent for the fodder and cereal crops, use and production of earth worm culture in the farmers' fields etc. These technologies can be easily set up and demonstrated in the project area.

Fisheries Programs:

1. Many of the above mentioned suggestions and recommendations are relevant. They can be suitably modified and adopted for the Fisheries Development Program.
2. TANUVAS can also guide in designing suitable fish feed and its standardization, with high potential for fish production.
3. Encouraging farmers to keep records of fish production, and income, recurring expenditure, disease and health monitoring of fish and the pond water. This data will be required when project impact studies are conducted by the bank.
4. As the number of farm ponds increase in the project area, establishing forward linkage for marketing of fish will be required
5. New Ideas to improve farmer's income:
 - (a) In order to increase income from aquaculture in the farm ponds, the bunds of farm ponds could be used to grow suitable crops like coconut which is commonly done by farmers in Krishna and Godavari basins in Andhra Pradesh.
 - (b) In some cases, a portion of the pond is fenced to rear ducks so that the manure is available for plankton growth.
 - © In more sophisticated cases, circulation of pond water for more aeration and oxygen supply and use of spirulina algae culture for purification and to maintain acid-alkaline composition of pond water is being used.
 - (d) Improvement in netting material and collection of grown up fish would be desirable as the labor costs are rising.
 - (e) Mixed cropping with other fish varieties can be tried as a pilot experiment.