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GUIDING PRINCIPLES

FOR IMPLEMENTATION OF
RESTRUCTURED COMMAND AREA DEVELOPMENT
AND WATER MANAGEMENT PROGRAMME

REVISED DRAFT

GOVERNMENT OF INDIA
MINISTRY OF WATER RESOURCES
CADWM WING
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LIST OF ABBREVIATIONS

APM	-	Adjustable Partial Module
CAD	-	Command Area Development
CADA	-	Command Area Development Authority
CADWM	-	Command Area Development & Water Management
CCA	-	Culturable Command Area
CWC	-	Central Water Commission
DPR	-	Detailed Project Report
DVC	-	Damodar Valley Corporation
FRL	-	Full Reservoir Level
FY	-	Financial Year
GoI	-	Government of India
ICAR	-	Indian Council of Agricultural Research
IGNP	-	Indira Gandhi Nahar Pariyojana
IMTI	-	Irrigation Management & Training Institute
IP	-	Irrigation Potential
IRDP	-	Integrated Rural Development Programme
IT	-	Information Technology
MCM	-	Million Cubic Metres
M ha	-	Million Hectare
MI	-	Minor Irrigation
MoA	-	Ministry of Agriculture
MoRD	-	Ministry of Rural Development
MoU	-	Memorandum of Understanding
MoWR	-	Ministry of Water Resources
NGO	-	Non-Government Organisation
OFD	-	On-Farm Development
O&M	-	Operation & Maintenance
PIM	-	Participatory Irrigation Management
R & D	-	Research & Development
TOT	-	Training of Trainers
USAID-	-	United States Agency for International Development
VIP	-	Very Important Person
WALMI	-	Water and Land Management Institute
WR	-	Water Resources
WUA	-	Water User Association

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1 INTRODUCTION

The Command Area Development (CAD) programme was initiated in 1974 with the objective to bridge the gap between irrigation potential created and that utilised through micro level infrastructure development and efficient farm water management; to enhance agricultural production and productivity; and to improve socio-economic conditions of the farmers. Presently, there is a gap of about 14 million hectares (Mha) between the irrigation potential created and that utilised. Taking the average cost of Rs. 10000 per ha for creation of irrigation potential, an investment of Rs. one lakh forty thousand crore thus remains under utilized. The annual interest at the rate of 7 percent would be Rs. 10000 crore. The central theme under Command Area Development and Water Management (CADWM) programme thus continues to be the efficient utilization of created irrigation potential.

Many of the irrigation projects in the country have also been under operation below their potential due to inadequate maintenance, which has been the single most important factor for reduced irrigation efficiency at project level. This has resulted in the problem of unreliability in the availability of irrigation water at farm level causing low efficiency of water usage and low productivity. Majority of the present problems include inequity in distribution of water, inefficient and over irrigation, resulting in waterlogging and salt accumulation in root zones of crops, slow pace of formation of Water User Associations (WUAs), inefficient and uncontrolled usage of surface and ground water, low water charge recoveries etc. are directly attributed to unreliability in availability of water. The restructured CADWM programme attempts to alleviate these deficiencies in the system above the outlet through new component of correction of system deficiencies besides the development and management activities below the outlet. Restructuring of the programme envisages rehabilitation and remodeling of existing minor irrigation tanks within irrigation project commands to enhance water availability and reduce seepage losses under medium and minor tank projects.

Increasing trend of waterlogging, salinity and alkalinity is offsetting the advantages of irrigation by rendering the affected areas unproductive or under-productive. The process of reclamation has just begun which is far exceeded by an additional area becoming waterlogged and saline/alkaline. CADWM programme, therefore, aims at reversing the trend by efficient utilisation of irrigation water and increasing the pace of tackling this problem by bringing in newer technologies like sub-surface drainage and bio-drainage under the realm of the programme.

On reviewing the position of irrigation potential under different types of projects, it is observed that till the end of IX plan, an irrigation potential of 37.08 Mha has been created through major & medium irrigation projects and 56.90 Mha through minor Irrigation projects. Under the CADWM programme about 28.48 Mha of Culturable Command Area (CCA) has so far been taken up against which main CAD activities have been completed in 16.86 Mha by the end of December 2004. It is, thus, clear that we have still a long way to go to effectively utilize the created irrigation potential. CADWM programme will have to be continued, therefore, not only during the remaining three years of the X Plan but much beyond that.

The restructured programme considers almost all aspects of the water resources management which include development and management of the irrigation system up-stream of the outlets (up to distributaries of 4.25 cumec or 150 cusec capacity) and below the government outlet for scientific water utilisation through various developmental and management works and down to the field drainage which leads ultimately to the natural outfall through collector, intermediate and main drains. In brief these components include:

- a. Operation of the irrigation system and mechanism to supply water according to the approved cropping pattern and considering the demand as per the modern farming technology in equitable manner;
- b. Correction of system deficiencies at conveyance level;
- c. Desilting / rehabilitation of existing MI tanks in irrigation commands and integrating the same with the system;
- d. PIM to sustain the programme by handing over system for management by farmers through WUAs;
- e. Assured water availability at farm gate and within outlet command with the help of WUAs;
- f. Introduction of suitable technologies through advancement of knowledge of stake holders by way of training, demonstrations and adaptive trials;
- g. Involvement of WALMIs and other State/Central agencies into the field oriented programmes,
- h. Improving monitoring and evaluation through inbuilt system of receiving quarterly progress reports and annual administrative reports etc.
- i. Greater coordination among multi-disciplinary agencies through a coordination and appraisal committee,
- j. Proper drainage of surplus water from the fields directly into the drains for reuse/recharge elsewhere and bio-drainage & sub-surface drainage and
- k. Linking the programme and progress periodically considering quality and quantity aspects in view and taking action accordingly.

The programme covers a great deal of activities responsible for bringing in greater efficiencies in land water and crop management. The success of the programme would, however, depend on the CADAs/State agencies that are implementing the programme through coordination of the concerned departments/ organizations and other related inputs.

2 CONSTRAINTS OF CAD PROGRAMME AND NEED FOR RESTRUCTURING

2.1 CONSTRAINTS OF CAD PROGRAMME

Since its inception, the CAD programme had been evaluated from time to time. Initially, a system of self-evaluation was under operation. All the information used to be compiled at the project level, a gist of which was being maintained in the Ministry. However, as the number of projects grew and the programme became widely spread, the system of detailed evaluation through NGOs for selected projects was introduced. The evaluation of the programme in the past clearly brought out the immense benefits of the programme in terms of better utilisation of irrigation potential created, better efficiency of water use, increase in intensity of irrigation, increase in agricultural production and productivity, increase in farmers' income etc. Though sub-optimal, the programme has primarily been responsible in achieving its stipulated objective of bringing enhanced production and productivity in the country yet stipulated targets still remained to be achieved. However, there have been certain constraints which are:

- a) Unreliability of water supply at the government outlet mainly due to system deficiency,
- b) Waterlogging / drainage congestion, non availability of drainage system and unscientific water use,
- c) Gap between scientific technologies of efficient water use at farm level,
- d) Lack of participation of farmers in water management,
- e) Lack of conjunctive use of surface and ground water,
- f) Restrictions to take the programme in minor irrigation commands in hilly areas only,
- g) non inclusion of correction of system deficiencies and main drainage system under CAD Programme
- h) Lack of matching budgetary support by State Governments to execute the programme

2.2 NEED FOR RESTRUCTURING THE CAD PROGRAMME

In view of these constraints a need had long been felt to restructure the CAD programme. After considerable deliberations in the meetings of State Secretaries in charge of CAD programme, Planning Commission and Ministry of Finance etc. held in June 2002 the programme has been restructured to take care of the constraints experienced in the past. The Programme activities also need to be implemented keeping the following perspective in view:

2.2.1 Accelerating the pace of CAD activities

The OFD works i.e. construction of field channels, field drains, land levelling and shaping, reclamation of water logged areas and enforcement of Warabandi are being done directly by CAD Authorities, while other components related with agricultural development, irrigation drainage and conjunctive use of surface and ground water are being attended through coordination of various agencies. The core component of the On-Farm Development works is however, the construction of field channels. The data giving achievements in respect of construction of field channels reveal that an area of 27.9 lakh ha was covered from 1974 to 1980, which increased to 51.8 lakh ha in the 6th plan. However this got reduced to 31.7 lakh ha during 7th Plan and further reduced to 17.6 lakh ha during 8th Plan and almost similar area was covered during 9th Plan. The main reason for slow down in the progress was reported to be inadequate budgetary support by the State Governments for the programme.

Overall an area of 16.63 Mha has been covered under the core components particularly, construction of field channels in a period of about 30 years. The present progress of 4 to 5 lakh ha per annum would require another 25 to 30 years to complete the work even in the projects, which are presently under the programme implementation. It is, therefore desirable to complete these projects within 5 -10 year's time, for which physical targets and financial outlays need to be increased considerably. State Governments may like to review this aspect and accelerate the pace of implementation by suitably revising physical targets and financial outlay.

2.2.2 Quality control in construction of works

Construction of field channels, field drains, reclamation of waterlogged areas, correction of system deficiencies and renovation of Minor Irrigation tanks are the core components of the new CADWM programme. To ensure the quality of these activities, proper survey & planning, supervision, verification and periodical monitoring and evaluation of quality, etc. need to be done. State Governments need to evolve suitable procedures in consultation with the Ministry of Water Resources for ensuring quality of CAD works.

2.2.3 Development of reliable database in respect of CADWM Programme to quantify the accrued benefits

Formats have earlier been prescribed for quarterly progress, annual progress and Annual Administrative Reports. While sending these reports in respect of each CAD Project, few columns only are filled and other columns are left blank without assigning reasons. At the Ministry level, a number of VIP references, Parliament Questions etc. are received asking for information on physical and financial achievements viz-a-viz their targets. The data is also

required for planning purpose and for the assessment of the impact of CAD activities. State Governments, therefore, need to improve their database by bringing about office automation to facilitate use of IT based tools.

2.2.4 Documentation of OFD works in the revenue records

It has been observed that after the On-Farm Development works are over in an area, the field units move to other areas and the work like field channels, field drains, structures made by them go unrecorded in the Revenue Records. It may be ensured that all those works are entered in the Revenue Records including the maps and these structures are considered as the part of irrigation system.

2.2.5 Setting up of targets for increase in the irrigated area and related aspects

There is an urgent need to increase the irrigated area by way of efficient water management, up-gradation of technical know-how of the farmers, timely water supply including inputs, etc. It would, therefore be desirable that targets like increase in the irrigated area, increase in the productivity, effect on the soil environment on account of the implementation of CAD activities are brought out annually. Regional/ project level benchmarks may be used as guide (section 7.0) in achieving performance objectives and targets may be fixed accordingly. The targets for the CADWM activities should be decided on the basis of these targets and financial outlays. This would help in plugging the loopholes coming in the way of, increasing irrigated area and boosting agricultural production. State Governments may examine this issue and devise suitable procedures for the purpose.

2.2.6 Transparency in release of water and roster schedules

Timely release of water from the canals is very important. It would be appropriate if the CAD organisations in the States and Irrigation Departments/project authorities and farmers (WUAs) are closely associated with the water release plan for each project. The release of water during the season should be reviewed from time to time to ensure that difficulties faced are removed. Proper institutional arrangement and communication network are required to be put in place for the same. To bring in transparency, it would be desirable that beneficiaries at the grass root level are involved in the programme.

It would be desirable to create Web sites of the CAD programme in each State/CADAs in local language. Details of roasters of water supply, training programmes, results of adaptive trials can be put on the web sites for benefit of the beneficiaries.

2.2.7 Adequacy of implementing staff

The Programme envisages multi-disciplinary team for taking up all activities related with irrigated agriculture. In some of the States, the staff of CAD Authorities on deputation from different Departments is doing the work. This has been found workable but in many of the projects, the work of CAD Programme is entrusted to the officers of the other departments, who are not under the direct control of the CAD Authorities. This results in according low priority to the work of CAD project and unsatisfactory progress under the programme. In this way, work in some of the States has come to a standstill. The annual expenditure in some of the states is declining despite enormous works yet to be completed. The establishment costs are very high in some of the States. It would, therefore, be desirable to have a proper team of functionaries under the administrative control of the CAD Authority. If the staff is on deputation, the tenure should not be less than 3 to 5 years. Another problem, which has been experienced is that multi-disciplinary staff is not adequate. There are only few units for construction of field channels. Staff for survey and taking up of other development activities is not provided. It would be desirable that adequate experienced staff is posted in carrying out the implementation of CAD Programme in each State.

2.2.8 Dissemination of technical know-how among farmers as a part of training programme

There is a wide gap between the innovative research made in research institutes, universities, WALMIs etc. and technology being adopted by the farmers in respect of crop production, use of irrigation methods, frequency of irrigation and other technical know-how in respect of irrigated agriculture. States may collect this type of data from these institutions and present it in an understandable form for distribution among farmers. They may also think of having water use technology seminars, dissemination of information for distribution among farmers and at the panchayats offices. Even display boards depicting the methodology and suggestions for taking up innovative measures for scientific management for boosting agriculture production on one hand and checking waterlogging on the other can be put up.

2.2.9 Timely submission of Quarterly, Annual Progress Reports and Annual Administrative Reports

Data on various CAD activities in the States is received through Quarterly and Annual Progress Reports and Annual Administrative Reports in the CAD Wing. It has been observed that these reports are not sent in time, which creates a problem as the data is to be compiled, analysed and then supplied to the Ministry of Programme Implementation, Planning Commission, etc. It would therefore, be desirable for the project authorities and State Secretaries to ensure that these reports are supplied in time to meet the requirement of this Ministry.

Proformae for submission of Quarterly and Annual Progress Reports have been revised in accordance with the restructured CADWM Programme and the same are given as Annexures-I & II. A copy of the quarterly as well as annual reports should also be sent to the concerned field office of CWC.

2.2.10 Release of Central Assistance to States

Letter inviting proposals for the release of Central assistance on ad-hoc basis for the first quarter and for regular release in subsequent quarters are being sent every year to all States prescribing due dates for submission of proposals. It may be pointed out that the proposals for ad-hoc release are not received in time from many of the State Governments and also there is considerable delay in sending the detailed proposals. As a result of delay, first installment of central assistance is not released to States in time. The State Governments, therefore, need to send their detailed proposals by the due dates to enable the Ministry for release of first installment of Central assistance in time. For subsequent installments, the States should send expenditure and physical progress made upto the preceding quarter of the year and the anticipated expenditure and progress for the subsequent quarters of the year. The proposal for final installment should reach the Ministry by 15th January every year. This will enable the Ministry to ensure even distribution of expenditure in all the quarters and make final release to the States in time. The requirement of funds should also be evenly spread over each quarter.

3 RESTRUCTURED CADWM PROGRAMME - ITS KEY COMPONENTS

3.1 KEY FEATURES

Based on the recommendations of the Working Groups of the Planning Commission on "Command Area Development Programme" and "Private Sector and Beneficiaries Participation in Irrigation Water Management" and the views expressed by the State Governments, the existing CAD Programme has been restructured and renamed as "**Command Area Development and Water Management**" (CADWM) Programme and is hence forth called as CADWM programme.

The CADWM programme retains those components of the existing scheme, which have been found to be beneficial to the farmers. The programme includes a few new components which have been considered necessary like correction of deficiencies in the irrigation system and providing upkeep of the drainage system. Some of the components which have lost their utility over time are deleted. The details of the components under the restructured programme are as under:

3.1.1 Continuing Components

- (i) Survey, planning and designing of On-Farm Development (OFD) works;
- (ii) Construction of field channels, now with a minimum of 10% beneficiary contribution of the total cost of construction;
- (iii) Full package OFD works including construction of field channels, realignment of field boundaries, land levelling and shaping also with a minimum of 10% beneficiary contribution of the total cost of construction;
- (iv) Warabandi (to be continued without central assistance);
- (v) Construction of field drains, intermediate and link drains for letting out surplus water;
- (vi) Reclamation of waterlogged areas in irrigated commands using conventional techniques as well as bio-drainage wherever applicable, now with a minimum of 10% beneficiary contribution of the total cost;
- (vii) State sponsored software components such as trainings of farmers and field functionaries & officials, adaptive trials & demonstrations, action research for Participatory Irrigation Management, seminars/conferences/workshops, monitoring & evaluation of the programme etc. through Water and Land Management Institutes (WALMI) and other institutions with seventy-five percent funding from Government of India;
- (viii) Functional grant to Water Users' Associations; (ii), (iii), (v) and (vi)

- (ix) Establishment cost - 20% of OFD works items at above and
- (x) R & D Activities, including training of senior level officers, holding conferences, workshops, seminars etc. directly by the Ministry.

3.1.2 New components

- a) Correction of system deficiencies above the outlet up to distributaries of 4.25 cumec (150 cusec) capacity;
- b) Renovation and de-silting of existing irrigation tanks including the irrigation system and control structures within the designated irrigation commands with a minimum of 10% beneficiary contribution (of the total cost) as maintenance fund, the interest from which has to be used for maintenance in future; and
- c) Use of location specific bio-drainage techniques to supplement conventional techniques for reclamation of waterlogged areas as a part of item (vi) under the Continuing Components (para 3.1.1).

3.1.3 Deleted Components

- a) Land levelling & shaping (subsidy);
- b) Sprinkler & Drip irrigation (subsidy);
- c) Conjunctive use of surface and ground water (subsidy); and
- d) Crop compensation and introduction of suitable cropping patterns.

Thus the scheme would encompass all aspects of water management for efficient and equitable distribution of water in the commands of irrigation projects for optimal utilisation and augmentation of water use in a participatory manner.

3.2 PRESENT TENURE OF THE CADWM PROGRAMME

The CADWM programme shall remain in operation with effect from 1st of April 2004 to 31st of March 2007 i.e. during remaining three years of X Plan.

3.3 REVISED FINANCING PATTERN AND COST NORMS (2004-07)

The old programme was in operation on 50:50 funding pattern basis between Centre and States. In view of recurring shortage of funds with the States to provide matching share, enhanced funding had been proposed for some of the existing key components. However, the Government of India has retained the existing financing pattern of 50:50 between Centre and States in the CADWM programme except in case of State Government sponsored software components, in which case the funding pattern would now be 75:25 between the Centre and States.

In case of certain select activities such as construction of field channels and full package OFD works and reclamation of water logged areas, 10%

minimum mandatory contribution (of the total cost) by farmers through WUAs shall form a part of the state share.

The 10% mandatory contribution (of the total cost) by farmers through WUAs in case of rehabilitation and remodelling of Minor irrigation tanks will not become part of State share but shall be deposited in the corpus fund of the WUAs and the interest accrued thereon can be used by WUAs for future maintenance of tanks and its control structures. Thus, both Central and State governments have to provide full 50% share for this activity.

In case of continuing software items such as (i) adaptive trials and demonstrations, (ii) action research, (iii) courses organized/sponsored by States/Projects/CADAs for officers, field functionaries and farmers, (iv) monitoring and evaluation sponsored by the States, (v) seminars, conferences etc. the financing pattern shall be 75:25 between Centre and State respectively. These activities are necessarily to be carried out by the States through WALMIs and/or other State/Centrally sponsored institutions only in consultation with the Ministry of Water Resources. State Governments may send proposals in this regard to the Ministry for advance approval.

Continuing software activities, such as training of senior level officers through National level training courses, workshops, seminars and conferences, evaluation, monitoring and other special studies sponsored by the Centre, shall continue to be funded at 100% by the centre.

Sanction for the revised funding pattern and revised CADWM norms has already been issued vide letter no. 2-10/2001-CAD dated 25.2.2004, a copy of which is placed at Annexure - III.

3.4 BASIS OF REVISION (2004-07)

The cost norms of the old programme had not been revised since 1995. Many of the States had been facing the difficulty in meeting these norms due to escalation of labour and materials costs. The issue of increase in cost norm had been debated during IX Plan. The two working groups of Planning Commission for X Plan had made recommendations for increase in cost norms of almost all CAD activities. This issue had also been discussed in the meetings of the Secretary/In-charge CADA held in the past. Based on these deliberations, the cost norms for the CADWM programme have been revised, keeping in view the following principles.

- a) **Cost Norms** - There is no in-built escalation and uniform cost norms are projected for a fairly long period. In true spirit of all central schemes, expenditure beyond the prescribed norms should devolve on States. Many of the States have a tendency to limit the expenditure to cost norms. Realistic targets are to be worked out component-wise including those of new components indicating year-wise phasing of targets. Normally, the expenditure on any component should not exceed the cost norms and the

same over and above the norms is to be borne by the States. There is no salary component of establishment involved in the cost.

- b) **Loan** - The component on Loan to State Governments for equity support to Land Development Corporations is dropped.
- c) **Convergence** - Separate funds are provided to State Governments for certain components (roads, mandis etc.) and as such these items are not covered under the central CADWM assistance. Many of the schemes of MoWR, MoRD, MoA and other central Ministries have common linkages for land and water infrastructure development. The drafted schemes henceforth should provide clear linkages, integration and convergence to such schemes for holistic development.
- d) **Subsidy** - IRDP pattern based subsidy component on land levelling, sprinkler, drip and development of ground water structures, which was meant for special category, small and marginal farmers is withdrawn from the CADWM programme primarily because of similar programmes being run by other Ministries. Though being withdrawn, these components should remain to be effectively integrated into the CADWM programme for over-all objective of land development and water conservation.
- e) **Conjunctive use** - Similarly the conjunctive use of surface water with ground water has to be effectively planned, implemented and monitored as integrated development and management of ground water with surface water serves the twin purpose of supplementing the surface water on one hand and controlling the rise of ground water on the other hand to avoid water logging, salinity and alkalinity. However, central assistance for this component, which was in the form of subsidy on IRDP pattern, now stands withdrawn.
- f) **Monitoring and Evaluation** - A comprehensive monitoring and evaluation mechanism is in-built into the programme.
- g) **Establishment** - While three new components have been introduced and four components are dropped, it is felt that no new establishment cost would be necessary on this account and the escalated cost of establishment if any would be taken care of through enhanced cost norms. The establishment cost norm has been retained at 20% of the actual expenditure of three existing components namely; construction of field channels including full package on OFD works, construction of field drains, intermediate drain, & link drains, and reclamation of waterlogged areas.

Establishment cost varies from State to State and very much depends on number of projects and the extent of works taken up. In order to reduce the establishment cost, State Governments are requested to realistically increase their budget components for OFD works. It is anticipated that all

States shall maintain and provide information on establishment cost so that a realistic estimate on this account is made. By all means, establishment-cost component should be minimized.

- h) **Warabandi** – Central Assistance to the component on Warabandi has been discontinued and the requirements of funds for repair/installation regulatory structures APMs etc. for its enforcement shall be met from the component of correction of system deficiencies. Warabandi henceforth has to be enforced by the Water Users' Associations and the State Governments have to ensure its effective enforcement through WUAs at all levels. Thus, Warabandi shall remain important component under the programme and its monitoring at State level will have to be continued as before.
- i) **Land levelling** - It has been our experience that the farmers prefer to execute the land levelling component themselves rather than going in for a subsidy. Despite efforts, disbursement of funds on this component had been minimal. While this activity remains an effective and integral part of the scheme, the subsidy component on Land levelling is henceforth withdrawn.
- j) **Full package OFD** - Terracing and land levelling in hilly terrains is an important activity requiring large funds for mechanized handling, which is beyond the limits of small and marginal farmers. At the request of certain States, a new component on Full package OFD works is being introduced at higher cost norms in special category States. This component shall enable the hilly and special category States to go in for mechanized terracing at Government cost and covers the cost of construction of field channels and land levelling. Similarly some of the other States prefer to perform land levelling and realignment of field boundaries at Government cost. In case of these States, the component on full package OFD has been retained but at no extra cost and it is anticipated that additional cost if any on that account shall be borne by those States. The component on full-package cover all costs associated with construction of field channels and land levelling /terracing /realignment of boundaries at Government cost.
- k) **Coverage** - The CADWM programme at present covers major and medium schemes from all over India. However, in case of special category hilly States of North-East, J&K, Himachal Pradesh, Uttranchal, and hilly parts of West Bengal, minor irrigation schemes are also covered under the CADWM programme. In order to implement the scheme in an effective manner, it has been decided to implement the scheme in 133 ongoing projects only. Additional new projects if any can be taken up only in those States, where a major portion of work has been completed and projects are withdrawn from the scheme in terms of both numbers deleted and area covered.
- l) **PIM** - Participatory programme is, the central theme of the CADWM programme and a minimum of 10% contribution (of the total cost) on selected items is to be paid by all farmers through their WUAs so that these associations get inspired and willingly own the systems. Henceforth, the CADWM programme is to be implemented only in those project areas where the legalized associations are formed and are effective and willing to take over the system up to distributaries of 4.25 cumec (150 cusec). The

beneficiary contribution through WUAs should be either in cash or through labour. The States may devise suitable mechanism in this regard and inform the Ministry about the same. The component on correction of system deficiencies shall be implemented only after WUAs are willing to take over the system. A MoU is to be signed between the WUAs and the State departments in this regard and the distributaries are to be handed over immediately after they are corrected of their deficiencies. The State departments may have to ensure timely supply of water at the head of these distributaries.

- m) **MI Tanks** - In case of many of the projects, particularly in southern and Central states, a large number of existing Minor irrigation tanks within the irrigation commands of these projects have either been silted up or are encroached upon, thereby limiting their utility to augment supplies to the existing system within the commands. It has been decided to rehabilitate and remodel all such existing tanks and integrate them in the irrigation commands of the projects. The rehabilitation and remodeling of these tanks has to be taken up at the last stage after all other CAD activities in the command have been completed. State Government has to bear 50% cost of this component. A 10% contribution by WUAs/farmers is mandatory for sustainable running/future de-silting of these tanks for which an effective mechanism is to be devised before implementing the component. This contribution has to be deposited into the accounts of WUAs as maintenance corpus fund and the interest from the same will be utilized for maintenance. Non-integrable and new tanks are beyond the purview of CADWM programme and shall be developed by States through other funds/schemes.
- n) **Bio-Drainage** - In order to promote agro-forestry in waterlogged commands, a new component on bio-drainage has been integrated with the existing component of reclamation of waterlogged areas. This component can be executed either in isolation or in conjunction with the existing components of horizontal surface or vertical pumping drainage. There are many apprehensions associated with bio-drainage component for which research projects related to adoption of suitable region-specific tree species, the ecological behaviour of co-existence of irrigated crops with these selected species and geometry of trees have already been awarded to various institutes/ organisations under the R&D component of the Programme. The Ministry hopes to evolve guidelines on this aspect in due course of time. It is, therefore suggested that the bio-drainage component, wherever is to be introduced, should be implemented in full consultation with the ICAR centers, State Agricultural Universities and/or State Forestry departments. Full details of this item should be provided to this Ministry and prior concurrence of Government of India should be obtained before executing the component.
- o) **Sub-surface drainage** - A component on reclamation of waterlogged areas through sub surface drainage at a cost of Rs. 40,000 per ha is being introduced under the CADWM programme. This component has to be implemented as a last resort justifying that the reclamation through conventional horizontal surface or vertical pumping is not sustainable. A

separate detailed estimate has to be prepared and got approved by this Ministry.

- p) **Correction of system deficiencies** – A number of irrigation projects in the country have been operating much below their potential due to shortage of funds for O&M related activities such as cleaning of the channels by de-silting and weeding, raising earthwork in embankments or dressing the bed and side-slopes to the design standard and removing undercuts in hard strata, strengthening of banks in filling sections, restoring bed gradients, replacing and painting metal parts in gates and hoists, making control and measuring devices fully functional etc. This has been by and large responsible for unreliability in availability of irrigation water at farm level and consequently the reduced irrigation efficiency. The scope of the CADWM Programme is, therefore, expanded to take care of system deficiencies occurring above the outlet (on distributaries of capacity up to 150 cusec) through proper rehabilitation. This would eventually improve the output of the activities below the outlet as well. A cost norm of Rs 4000/-per ha. has been adopted for this item. The State Governments will be required to ensure that distributory Committees are formed, who can take over these distributaries for operation and maintenance, after these have been rehabilitated. The financing pattern for this component will be 50 : 50 between the Centre and States.

4 GUIDING PRINCIPLES FOR IMPLEMENTATION OF THE CADWM PROGRAMME

The new programme has been approved subject to the following requirements:

- (i) Convergence with other schemes of various Ministries should be in-built into the projects.
- (ii) On-going projects should be prioritised and projectised. During X Plan priority should be given for completion of on-going projects. New projects can be taken up only in those States where all ongoing projects have been completed efficiently and effectively. Projectization should be a key element of the implementation strategy which means that Detailed project Reports (DPRs) should be prepared for each of the ongoing projects, with time frame, budget, action plan, deliverables and success criteria being clearly spelt out.
- (iii) Assistance would be conditional to enactment of PIM Legislation. Till this is done alternative arrangements should be made for formation and empowerment of Water Users' Associations.
- (iv) Water Users' Associations should be in position before project components are taken up so that beneficiaries are involved in the projects since inception. Water User Associations should be formed immediately in on-going projects, wherever this has not been done, before further funds are released.
- (v) The component of rehabilitation/renovation of minor irrigation tanks should be implemented only after other Command Area Development works are completed.

4.1 SUBMISSION OF DETAILED PROJECT REPORTS (DPRs)

Command Area Development Programme has been conceived as an integrated programme to orchestrate all the activities crucial for increasing agricultural productivity in the command areas leading to better utilization of created irrigation potential. The concept involved an innovation by way of bringing together various activities hitherto looked after by a number of different departments in the State. This dynamic process of harmonizing water, crop and land is managed by a multidisciplinary team of Irrigation Engineers, Agronomists, Soil Scientists and Agricultural Engineers under the overall control and direction of Command Area Authority.

Since inception the programme has been under implementation as an open-ended programme wherein States send their claims for reimbursement of expenditure made by them. The States often execute limited activities. For the

Systematic development of the Command Areas, it has been decided that the CADWM projects are executed as close-ended projects and all activities are executed in a holistic manner so that the objectives laid for the programme are optimally achieved. State Governments are thus required to prepare a comprehensive project report of all the activities under the CADWM projects at the beginning of each Plan period. The DPRs of all continuing projects for the remaining period of X Plan may be prepared and sent to this Ministry as well as to the concerned field Chief Engineer of CWC. A new format for preparation of DPRs has been devised and is given at Annexure - IV.

4.2 PRIORITIZATION OF PROJECTS FOR COMPLETION DURING X PLAN

In a number of states several projects have been continuing for a very long period. Such states need to prioritize the last mile projects, which can be completed during the remaining period of X Plan.

After receipt of DPRs of all ongoing projects, Ministry proposes to hold discussions with each State and fix priorities in consultation with the state Governments/CADA officials so that the benefits of the limited grants are evenly spread and more and immediate benefits are accrued.

4.3 CONVERGENCE WITH SCHEMES OF OTHER MINISTRIES

There are several Centrally Sponsored Schemes being run by the Ministries of Agriculture and Rural Development and which have provision for promoting On-Farm Water Management Practices, land development, diversification of cropping systems etc. Convergence of such schemes should be built into CADWM programme at CADA/Project level for maximizing the benefits to farmers. The DPRs shall incorporate detailed information on all ongoing schemes particularly on mechanism of convergence.

4.4 MANDATORY PIM AND – INSTITUTIONAL SUPPORT TO WUAs

The involvement of farmers in the management of irrigation is essential for increasing agricultural productivity and water use efficiency. The National Water Policy, 1987 emphasized the need for progressive involvement of farmers in the management of irrigation. Recognizing this fact, the Ministry of Water Resources in April, 1987 circulated guidelines to State Governments for forming Farmers' Associations or Water Users' Association and empowering them to collect water charges under the CAD Programme. A number of Action Research Programmes were taken up to assist the farmers to form Water Users' Associations, which would take up operation and maintenance of the system, collect irrigation charges and assume the responsibility for distribution of water. National Water Policy of 2002 has further supported the cause.

The Government of India has taken up several other initiatives to implement the programme. Participatory Irrigation Management is another area, which requires to be taken up seriously so that the pressure of maintenance is reduced on the State Government as the farmers share this responsibility. Registration of the WUAs can be done under Cooperative Act or Societies Registration Act, 1860 or other provisions, which could be planned by the State Government. To convince the farmers and to bring awareness, conferences, workshops and training on farmers' participation in Irrigation management may be held by project authorities, for which Central assistance to the extent of 75% is admissible. It is to emphasize once again that the formation of WUAs is mandatory for handing over of the distributaries for future O&M. For Details refer Sanction Order (Annexure –I). The DPRs may clearly bring out the mechanism under which the State Governments propose to implement this activity.

4.5 SUBMISSION OF COMPLETION REPORTS:

On successful completion of the project, a Completion report is required to be prepared by the CADA/State Government and to be submitted to this Ministry for considering the project for its deletion from the Programme. The Completion report should be prepared more or less on the pattern of the DPR in the format given at Annexure-II. The Completion report should also include details regarding progress achieved, status of implementation of PIM Programme, success stories, pre-project and post-project analysis of various technical and socio-economic performance indicators, analysis of impact of the programme based on evaluation studies, if any done either by the State Govt. or by this Ministry.

The Completion report may also bring out clearly the constraints, if any, encountered during the course of implementation of the Programme in the Project.

5 TECHNICAL DETAILS OF ON-FARM AND OTHER DEVELOPMENT WORKS

5.1 TOPOGRAPHIC AND SOIL SURVEY, PLANNING AND DESIGN OF OFD WORKS

Topographic survey is meant for proper planning and designing of OFD works so as to ensure their quality. Soil survey is meant for land capability classification so as to understand their capability for crop planning and undertake proper treatment measures to realize their full potential. Proper topographic and soil survey maps of the project should be maintained in CADA records.

5.2 CONSTRUCTION OF FIELD CHANNELS

Construction of field channels to the last field/ each holding is to be ensured under the programme. Twenty per cent lining has been advocated in general, considering that the lining of main field channels, where irrigation water flows for longer duration, reduces seepage to a great extent.

In some States, where topography and soil type induces wastage in different ways, field channels require more length of lining. Sometimes, this may be beyond 20%. Lining beyond 20% can be done but no additional Central assistance beyond the prescribed cost norms will be provided for the same. It has also been observed that in some States only earthen channels are constructed without lining, which are liable to be ploughed or damaged. The concerned officials are to ensure that each holding is connected by the field channel for enforcing proper Warabandi system. In some undulating areas, conveyance system through open channels may not be workable and in such areas laying of underground pipelines can be resorted to. In many areas although outlets were fixed in the minors / distributaries at the time of commissioning of the projects, later these have been removed and are not yet fixed. It is desirable that such outlets are in position before any field channel is constructed. Cost of such repairs used to be charged to the component on enforcement of Warabandi earlier. The same may now be charged to the component of correction of system deficiencies.

Area specific designs of field channels are considered more appropriate than standardized designs, though the later seem to be more economic. As far as possible, field channels may be designed to run on full supply discharge. This ensures lower seepage losses.

The role of legalized Water Users' Associations is being strengthened further by making a provision for mandatory contribution to extent of 10% (of the total cost) in cash or in the form of labour by the beneficiary farmers in the construction of field channels. Such a provision is considered essential to ensure involvement of beneficiary farmers in the construction and maintenance of field channels and imbibe in them a sense of ownership of the assets created. The Associations, which collect contributions from the beneficiaries in advance and deposit the same with the CAD Authority or promise contribution in the form of labour in writing, shall be entrusted with the task of construction of field channels under the overall supervision and guidance of CADA staff. The CADA staff will prepare the design and plan for construction of field channels in the outlet command in consultation with WUAs, provide them technical guidance at the time of construction of field channels, inspect and authenticate the details of expenditure incurred by the WUAs and also periodically monitor and review the progress of works. The cost norms of Rs. 6000/- and Rs. 10000/- per ha. respectively for plain and hilly areas including special categories areas have now been revised to Rs. 10,000/- and Rs. 15,000/- per ha. in the restructured CADWM Programme.

5.3 WITHDRAWAL OF COMPONENT ON LAND LEVELLING

The component of land leveling and shaping, which was financed as a subsidy item under the old CAD Programme has been withdrawn in the restructured CADWM Programme due to insignificant progress made and lack of interest on part of the farmers.

5.4 FULL PACKAGE OFD WORKS IN HILLY / SPECIAL CATEGORY AREAS

This would include construction of field channels, realignment of field boundaries and land levelling/shaping at a cost norm of Rs. 10,000/- per ha. in plain areas and Rs.18000/- per ha in case of hilly areas. The financing pattern for this component will be 50:50 between the Centre and State/ farmers, with at least 10% contribution (of the total cost) of farmers through their WUAs.

5.5 ENFORCEMENT OF WARABANDI

Warabandi comprises of deciding the day and time of delivery of water as per size of holding in consultation with the farmers. This activity is initiated immediately after the field channels are constructed. Generally, Warabandi schedules are prepared by agencies implementing the CAD Programme and these roasters are handed over to Irrigation Department. In these cases, it is not known whether Warabandi schedules are in conformity with the canal roasters. It is always desirable that Warabandi schedules conform to the canal roasters and monitoring of the schedules is done for at least two seasons to ensure proper working of the planned system for Warabandi.

This component will be continued for ensuring equitable distribution of irrigation water among the beneficiaries but without any Central Assistance.

5.6 CONSTRUCTION AND MANAGEMENT OF FIELD, LINK AND INTERMEDIATE DRAINS

Under the old CAD Programme, only field drains within the outlet command could be constructed with Central Assistance as there was no provision for construction of intermediate drains and link drains to connect them to main drains. Under the restructured CADWM Programme, this deficiency has been corrected by expanding the scope of this activity for construction of intermediate drains and link drains to connect them to main drains. For this purpose the existing cost norm of Rs 1000 per ha and Rs 2000 per ha respectively for plain and hilly areas has been revised to Rs 4000 per ha and Rs 5000 per ha respectively. The financing pattern for this component will be 50:50 between the Centre and States.

5.7 RECLAMATION OF WATERLOGGED AREAS

In spite of many precautionary measures, the irrigation has created the problem of waterlogging and soil salinity alkalinity in some of the areas

An area is said to be waterlogged when the water table rises to an extent that soil pores in the root zone of a crop become saturated, resulting in restriction of the normal circulation of the air, decline in the level of carbon dioxide. The depth of water table which is considered harmful would depend upon the type of crop, type of the soil and the quality of water which may vary from 0 m for rice to about 1.5 m for other crops.

Central Board of Irrigation and Power adequately describes the water logging as under:

“An area is said to be waterlogged when the water table rises to an extent that soil pores in the root zone of a crop become saturated, resulting in restriction of the normal circulation of the air, decline in the level of oxygen and increase in the level of carbon dioxide. The water table, which is considered harmful, would depend upon the type of crop, type of soil and the quantity of water. The actual depth of water table, when it starts affecting the yield of the crops adversely, may vary over a wide range from zero for rice to about 1.5 m for other crops”.

The Report of the Working Group (1991) on “Problem identification in irrigated areas with suggested remedial measures” setup by the Ministry of Water Resources (MOWR), defined waterlogged areas as under:

- | | | |
|-------|--|--|
| (i) | Water logged areas
(due to rise in water table) | Water table within 2 meters of
land surface |
| (ii) | Potential areas for water
logging | Water table between 2-3 metres
below land surface |
| (iii) | Safe areas | Water table below 3 metres of land
surface |

The problem of water logging can be mitigated by efficient water management and through taking up preventive measures. In some cases, remedial measures in the form of reclamation are necessary for bringing the lands back to their original productivity. Ministry of Water Resources has recognized this aspect and it has taken several initiatives in this regard.

5.7.1 Conventional drainage/ sub-surface drainage

A prerequisite for sustainable agriculture is maintenance of proper balance of water, air and salts in the root zone of plants. In some of the canal commands, irrigation has disturbed this balance resulting in rise in ground water table, waterlogging and secondary salinisation of soils. Apart from being an ecological disaster, it has a very adverse effect on agricultural production which can seriously jeopardize food security.

The balance of water, air and salts in the root zone of plants can be achieved by adequate drainage. Drainage can be either natural or artificial. Most lands have some natural surface and subsurface drainage. When natural drainage is inadequate, artificial drainage is required to increase the drainage capacity.

Artificial drainage is essential to sustain irrigated agriculture. Often, subsurface drainage is needed in irrigation commands to control the rising water table and avoid waterlogging and salinisation. Conventional subsurface drainage systems are of two types- subsurface vertical and subsurface horizontal drainage. When properly designed, installed and maintained, these systems are efficient in lowering the water table and preventing salinisation of irrigated lands. However, these systems have two drawbacks-namely they are costly and generate drainage effluents, which will have to be either carefully reused or safely disposed off.

So far reclamation of waterlogged areas was being done entirely through Government funds. A minimum 10 % contribution (of the total cost of construction) from the beneficiaries will now be mandatory. The existing cost norm of Rs. 12000 per ha. is revised to Rs. 15000/- per ha. for surface drainage and also for bio drainage, which was not included under the old Programme. The sub-surface drainage has also been included at cost norm of Rs. 40,000/- per ha. The financing pattern for this component will be 50:50 between the Centre and State/ farmers. The procedure of submission of specific area proposals for approval of the Ministry before implementation shall continue. Guidelines for submission of proposals for reclamation of waterlogged areas are placed at Annexure-V.

Water logging may be broadly divided into the following three different categories:-

- (i) Water logging caused by stagnation of water because of rain accumulation, over irrigation in the absence of proper draining system - the most feasible solution to such type of water logging is the construction of field drains connected with the main drain through the collector/inter-mediate drains. Under the CAD programme, financial assistance was provided to the States for construction of field drains. The scope of the drainage item has been enhanced and new financial assistance is also provided for the construction of intermediate and link drains. Cost norms have also been enhanced appropriately.

While forwarding proposals for works for reclamation of waterlogged areas, such works should not be included under reclamation, which are covered under the item of construction of intermediate and link drains.

- (ii) In another type of waterlogging, the land gets water logged due to the water coming into the land due to upland seepage, sheet flooding from top etc. causing tals. Massive flood-control schemes are required for protection of such areas, which are beyond the scope of the CADWM Programme.
- (iii) Water logging in which the water in the root zone obstructs the aeration of soil/(please see definition above) and is caused due to application of irrigation water/action of farmers is covered under the third category. Schemes for reclamation of areas affected by such water logging comes under the purview of this item and the proposals should mainly include crop/soil/water management schemes, bio-drainage schemes or sub-surface drainage schemes etc. For more details manual on water logging published by the CAD wing of MoWR may be referred.

5.7.2 New component of Bio-Drainage

An alternative to these conventional subsurface drainage systems is bio-drainage, which is less costly and more environment friendly. It is a combined drainage-cum-disposal system. Bio-drainage relies on vegetation, rather than mechanical means, to remove excess water. The driving force behind the bio-drainage concept is the evapo-transpirative power of plants especially of trees to lower ground water table. Bio-drainage is economically viable because it requires only an initial investment for afforestation and when established, the system could generate economic returns by means of fodder, fuel wood and small timber.

The concept of bio-drainage is new and evolving. So far, it has been tried on a limited scale under experimental conditions. Some practical experience on bio-drainage has been gained in Indira Gandhi Canal project of Rajasthan and a few irrigation projects in Maharashtra. Necessary technical guidance with regards to suitability of tree species for a particular Agro-ecological situation will

have to be ascertained from ICAR Institutes, State Agricultural Universities, State forest department etc.

5.7.3 Procedure for submission of proposals

The proposal will be first discussed in the State level monitoring committee and then will be forwarded to the regional offices of CWC. (The Constitution of the Committee is given at para 6.1.) The CWC will examine the proposal in consultation with State Government Authority before consideration of Ministry of Water Resources for approval

It is desirable that an exclusive cell dealing with water logging is established in the States where water logging is a major cause of land degradation which will carry out detailed study of the problem and remedial measures before sending proposals for financial assistance under the CADWM programme. Such cell may be established either in relevant department or WALMI as feasible.

5.8 ENHANCED INSTITUTIONAL SUPPORT TO WUAs

The functional grant to Water Users' Associations has been enhanced to Rs. 600 per ha. which will be shared in the ratio of Rs 270:270: 60 per ha among the Centre, State and the farmers.

5.9 ADAPTIVE TRIALS AND DEMONSTRATIONS

Adaptive trials involve evolution of suitable soil-water-crop relationships and management techniques suitable to the condition of farmers' field. This requires knowledge of a number of aspects such as agro climatic conditions, land development, crop varieties, proper doses and method of fertilizer application schedules, irrigation practices etc. consistent with the economic capabilities of the farmers. The focus of the adaptive trials should be on bringing about a switch over from traditional low risk, low input and low yield crops to high risk, high input but high yield and profitable crops. The Ministry of Water Resources circulated detailed guidelines on adaptive trials in 1989. An updated copy of these guidelines has been reproduced and is placed at Annexure-VI.

Demonstrations of scientific technology, covering scientific water management and land development practices, introduction of suitable crops and varieties, proper dose and methods of application of fertilizers, irrigation practices, etc. are very important for increasing productivity. These are taken up extensively under the Programme on farmers' fields and the farmers are provided practical training on these aspects.

Dissemination of technical know-how among farmers, being planned through adaptive trials, demonstration and training of farmers is not getting

sufficient attention. The need for training of farmers and functionaries continues as a critical requirement. To organize trainings, demonstrations and adaptive trials on regular basis for dissemination of know-how among the farmers it is proposed to strengthen the extension/ training activities through WALMIs and other institutions. The funding for this component is 75:25 between the Centre and the State.

5.10 ACTION RESEARCH PROGRAMME FOR PIM

It has been observed that not much activities under action research on PIM has been undertaken either by the CADAs or the WALMIs. Efforts under CADWM therefore need to be intensified to initiate action research on various aspects of PIM such as creating awareness on PIM, stress on equity, rights and duties of farmers, enforcement of Warabandi, collection of water charges, O&M of the system, running of societies etc. The funding for this component is 75:25 between the Centre and the State.

5.11 NEW COMPONENT ON CORRECTION OF SYSTEM DEFICIENCIES

A number of irrigation projects in the country have been operating much below their potential due to shortage of funds for O&M related activities such as cleaning of the channels by de-silting and weeding, raising earthwork in embankments or dressing the side-slopes to the design standard and removing undercuts in hard strata, strengthening of banks in filling sections, restoring bed gradients, replacing and painting metal parts in gates and hoists, making control and measuring devices fully functional etc. Lack of timely O&M has resulted in complete deterioration & dilapidation of canals and its structures. This has been by and large responsible for unreliability in availability of irrigation water at farm level and consequently the reduced irrigation efficiency. The scope of the Command Area Development Programme has therefore, been expanded to take care of system deficiencies occurring above the outlet up to distributaries of 4.25 cumec (150 cusec) capacity. This would eventually improve the output of Command Area Development (CAD) activities below the outlet as well.

With a view to ensure sustainability of the system deficiencies undertaken, before accepting the proposals for up gradation of the system, the State Governments will be required to ensure that distributary Committees (on distributaries of upto 4.25 cumec (150 cusec) are formed, which can take over these distributaries for operation and maintenance, after these have been rehabilitated. The financing pattern for this component is 50:50 between the Centre and States.

Detailed guidelines for formulation of Specific proposals for correction of system deficiencies are placed at Annexure-VII. The State Governments shall be required to submit detailed proposal in this regard, project wise and distributary-wise, to the Ministry for approval before implementing this component.

5.12 NEW COMPONENT ON RENOVATION OF MINOR IRRIGATION TANKS IN IRRIGATED COMMANDS

Majority of tanks constructed in the past are in need of urgent repairs. It is not unlikely that a number of disused tanks have been encroached upon and are being used for other purposes. Irrigation potential through Minor Irrigation tanks have been declined due to poor maintenance and other factors. However, they are still serving useful purpose. It will be necessary to see that they are restored to their original capacity and the necessary repairs to be carried out.

It is reported that, in the last 40 years the irrigated area by tanks is coming down steadily at an increasing rate. According to government statistics published by the Planning Commission, around 17 lakh ha of net area has been lost under tank irrigation measuring a capital loss of Rs. 5100 crore (Planning Commission 1999). Many of these are within the existing commands and can be easily integrated with the systems.

This new component will upgrade and bring the level of services to the beneficiaries envisaged in the Project Report. Also beneficiaries will be involved in the implementation of this scheme and maintenance functions will also be transferred to Water Users Associations (WUAs). This will improve the overall management of tank irrigation and help in regaining the lost irrigation potential of minor irrigation tanks. The objectives of the scheme would be achieved for selected tanks through low cost infrastructure improvement designed to support improved operation plan responsible for checking deterioration of the system. Thus, not confining the objective to the rehabilitation of the system alone, it has been extended to improve management of the system by making farmers increasingly responsible for maintenance of the tank schemes.

The cost norm for this item is Rs. 15,000 per ha of areas irrigated by the tank. The cost for rehabilitation is to be shared by Centre and the State Government in the ratio of 50:50. The 10% (of the total cost) mandatory contribution (cash or labour) by the farmers will be deposited with the Water Users Associations (WUA) as maintenance fund, the interest from which will be used for maintenance of the system. This component can be taken up only after other activities in the command have been completed.

Detailed guidelines for formulating specific proposal for renovation of MI tanks are placed at Annexure-VI. State Governments shall be required to submit detailed proposal in this regard, project wise, to the Ministry of water Resources for approval before implementing this component.

5.13 CENTRALLY SPONSORED TRAINING OF SENIOR LEVEL OFFICERS (TOTs)

The need for ensuring proper implementation of the Programme has resulted in making "training" a very important activity under the CADWM Programme. The Ministry of Water Resources provides Central assistance for

training of officials and farmers for implementing the CADWM Programme and Participatory Irrigation Management. Training activities were initiated during the Sixth Plan for functionaries of CADAs in the form of orientation training through seminars and workshops organised by the Ministry of Water Resources. During the Seventh Plan, central assistance was provided for these activities and training programmes were organised for middle, senior and top level officers at State and the Central levels. The training of middle level officers both from the Agriculture and Engineering disciplines were also taken up through WALMIs.

The National level training programmes are to be organised by this Ministry through Central/ State level organisations/ Institutions, WALMIs/ IMTIs and other leading institutions.

The purpose of the training programmes on PIM is to assist officers to appreciate legal, financial, administrative and motivational issues involved in farmers' participation and evolve strategies for implementing the concept. The training programmes are designed to study the organisation and performance of CAD Authorities, problems in the implementation of the Programme, inter-departmental co-ordination, and approaches to better utilisation of water etc.

5.14 COURSES ORGANISED BY STATES/ CADAs FOR OFFICERS, FIELD FUNCTIONARIES, AND FARMERS

As the National level Training courses are meant for Senior level officers of CADAs/State Governments, and cover very small part of the target group, the training courses for middle & junior level officers & farmers have to be organized by State Governments themselves at CADA/ Project level either directly or with the assistance of WALMIs/IMTIs' and other Central/ State level Institutions/ Organisations. There is now a need to strengthen WALMIs to take up this activity on a wider basis. The financing pattern for this component will be 75:25 between the Centre and States.

5.15 INCLUSION OF MI SCHEMES UNDER THE NEW PROGRAMME

In the old programme, minor irrigation schemes or their clusters with a CCA of at least 500 ha. in hilly areas were eligible for inclusion under the programme. As hilly areas do not have any medium or major irrigation schemes, to ensure better management of irrigation water in the hilly areas, Minor Irrigation scheme or cluster of Minor Irrigation schemes of the CCA of 100 ha are included under the restructured CADWM Programme.

5.16 CONJUNCTIVE USE

Conjunctive use of ground water and surface water will serve the dual purpose of increasing the area under irrigation on the one hand through supplementing canal water for irrigation and reduce waterlogging on the other. Conjunctive use of surface and ground water now form an integral part for

irrigation and its integrated development and management is a crucial factor in increasing agricultural production in command areas.

This component was covered under the old CAD Programme as a subsidy item but financing for this has been withdrawn in the restructured CADWM Programme due to poor response from farmers. There are several schemes run by the Ministries of Agriculture and Rural development, convergence with which can be built into CADWM Programme to promote conjunctive use of surface and Ground water.

5.17 COMPILATION OF INFORMATION

Data on demands and supplies of water, land use, environmental degradation, extension and marketing is crucial for successful management of any natural resource. It is anticipated that the States shall give due cognizance to this aspect and maintain a data cell in each associated CADA/ Organization.

6 MONITORING AND EVALUATION

There is not adequate mechanism for monitoring and evaluation of irrigation projects by the Centre. CADWM unit of MoWR and CWC do monitoring through periodical progress reports, detailed accounts (required to be submitted by the States with the release proposals), field visits, meetings, consultants' visits etc. Other than this, there is no mechanism by which old and new structures and their qualities/usefulness can be ascertained. Scope of monitoring needs to be enlarged, by way of covering all the aspects of CADP, increase in percentage of random test checks on the basis of progress reports given by the CADAs and field visits etc.

Concurrent evaluation is done by the States, CWC, and MoWR for knowing the direction of the programme, assessing the performance, identifying constraints, to suggest corrections if any. Post evaluation is done for taking lessons from the past for future planning. Use of remote sensing has been tried but has not been found effective, primarily due to scale of mapping, large scale ground truth confirmation and limitation of evaluation of characteristics related to areal extent. It is increasingly being felt that both monitoring and evaluation mechanisms need to be strengthened.

It has been decided to continue with the old system of monitoring through Quarterly and annual Progress Reports, Annual Administrative Reports and submission of physical and financial progress along with release proposals, field visits, through consultants etc. Besides, CWC will now on monitor all CADWM projects on proforma basis.

6.1 State Level Committee to Monitor the CADWM Programme

With a view to further strengthen the monitoring of the CADWM Programme the States should constitute a Committee at State level with composition as under:

1. Secretary in charge (CAD) in the State	Chairman
2. Representative Irrigation Deptt.	Member
3. Representative Central Water Commission	Member
4. Representative Central Ground Water Board	Member
5. Representative ICAR Regional Centre	Member
6. Representative State Agricultural University	Member
7. Director Water and Land Management Institute	Member
8. Representative Agriculture Deptt. (Extension Unit)	Member
9. Representative Project Level Committee formed under PIM Act	Member

10. Sr. Joint Commissioner (CADWM) GoI
11. Commissioner/ Administrator CADA

Member
Member Secretary

Wherever CADA Boards exist; the same can discharge the functions of State Level Monitoring Committee. However, their composition may be broad based to include the representation from various Central/State Departments / Organizations as suggested above. The State level Monitoring Committee may meet twice a year before Rabi and Kharif season and monitor/ review the performance of CADWM programme.

The indicative Terms of Reference for the Committee are as under:

- a. To decide the future work programme of CADA and ensure its implementation in an integrated and holistic manner and advise suitably.
- b. To review the progress of CADWM programme and make suggestions for improving its performance.
- c. To decide upon the evaluation Studies to be taken up at the State level.
- d. To review and recommend project proposals to be sent to CWC and GoI for approval.

The present system of evaluation of CAD Projects at National Level at 100 % Central cost and at State Level with enhanced funding of Centre: State as 75:25 shall continue.

7 BENCH MARKING OF PERFORMANCE INDICATORS

Benchmarking is simply the “introspection” since it is a continuous process of measuring one’s own performance and practices against the best competitors, and is a sequential exercise of learning from others’ experience. Under Benchmarking, opportunities for improvement are identified by conducting an internal assessment and making comparative measurements with best practice organisations to determine the performance gap between current practice and best practice. Selected best practices can then be suitably adapted to fit into the organization’s needs and implemented. Benchmarking in the irrigation system is now days considered essential. In the irrigation and drainage sector, service users are responding to a variety of challenges. Irrigation systems are coping with a vicious cycle that starts with inadequate maintenance, resulting in poor service that causes limited willingness to pay by users. The latter provides an insufficient maintenance fund that further reduces the operational efficiency of the system.

The State Irrigation Departments are also responding to a variety of challenges, including:

- a. Increased competition for water, both within the irrigated agriculture sector, and from other sectors.
- b. Increasing demand on the irrigation sector to produce more food for growing populations.
- c. Growing pressure to effect cost savings whilst increasing the productivity and efficiency of resource use.
- d. More private sector and users participation leading to more transparent and accountable (to users) management practices.
- e. Increasing interest by the wider community in productive and efficient water resource use and the protection of aquatic environments.
- f. Increasing need for accountability to both government and water users in respect of water resource use and the price paid for water.

By using appropriate performance indicators of benchmarking it is possible not only to improve the water use efficiency and financial viability of the system but also ensure adoption of best management practices and the environmental sustainability in the irrigated agricultural systems. This would also assist in evaluating the efficacy of farmers’ participation in irrigation management.

Objectives set forth for benchmarking are:

- a. Identifying the best management practices.
- b. Generating competition among various agencies or the projects, units for distributary networks and or Water Users' Associations (WUAs).
- c. Prioritizing and evaluating rehabilitation and remodeling or modernization projects,
- d. Assessing and monitoring the irrigation efficiency.

Indian National Committee on Irrigation and Drainage (INCID) has published guidelines for Benchmarking of Irrigation Systems in India. These guidelines provide know how on the purpose of assisting in the process of data identification, collection, entry, processing and analysis for irrigation and drainage benchmarking exercise. In all, 20 performance indicators have been identified to evaluate system performance (water use efficiency), agricultural productivity, functional and environmental performance etc. With the majority of the information being generated in the CAD Organizations, CADAs in association with the State irrigation departments could generate a series of performance indicators which can be compared with similar projects for defining benchmarks in not only within the project but also regionally.

Though, no expenditure is involved in this study, benchmarking should be made regular component of the CADA's activities. Benchmarking may be considered as regular feature of the CADWM programme.

8

CONTINUAL SUPPORT FOR TECHNOLOGICAL ADVANCEMENT

8.1 ROLE OF WALMIs AND OTHER STATE/ CENTRAL INSTITUTES IN IMPLEMENTATION OF SOFTWARE ACTIVITIES

With the broad objective of management of natural resources in a holistic manner in States, a number of Water and Land Management institutes had been established since eighties under USAID programme. The specific aims of their establishment was (i) to promote advancement of science and acquisition of scientific knowledge in development of land and water for increasing agricultural production; (ii) to provide in – service training of multi-disciplinary nature of staff and farmers engaged in irrigation management; (iii) to undertake action research/adaptive research on live irrigation system related to water and land management; (iv) to undertake activities which will promote optimal use of water and land resource; (v) to conduct workshops, seminars, farmers' meet and publication of magazines, periodicals, etc. and (vi) to provide consultancy services in water management and land development for irrigated agriculture.

A number of other institutes under Central/State Ministries and other organisations are also engaged in these activities. Since their inception the activities of these institutes have included training, professional and educational development, action research, participatory irrigation management and transfer of technology in the field of natural resource management. These institutes are also conducting Workshops/Seminars apart from providing consultancy services in water management & land development for advanced irrigated agriculture.

During the conference of the Directors of Water and Land Management Institutes (WALMIs) held on 22nd August, 2001 at New Delhi, one of the important recommendation was that the WALMIs should progressively become autonomous in their working and besides training, diversify their activities into adaptive research, action research, evaluation studies, monitoring etc. not only for canal irrigation but also for ground water irrigation, as well as domestic, industrial water supply and watershed management. In the Conference of State Secretaries-in-charge of CAD Programme held on 17th June 2002 at New Delhi, most of the States agreed for direct assistance to the WALMIs. Accordingly, the restructured CAD&WM Programme has envisaged greater role for WALMIs and other institutes in implementing the CADWM Programme in States. Some of the identified areas, where these institutes can contribute to CADWM programme are:

8.1.1 National Level Training Programmes

The National Level Training Programmes are meant for senior level officers of CADAs/Irrigation Departments who are responsible for policy planning, administration and Management of the CAD Programme. The funding for National Level Training Programmes is cent-per-cent from the Ministry of Water Resources. Some National Level Training Courses are offered to WALMIs and other agencies considering their specialization in particular aspects of Land and Water Management.

8.1.2 State Training Level Programmes

The Ministry had been providing funds to the State Governments in the past on 50:50 matching basis for a number of software activities. Under the CADWM programme the funding for these State level programmes has now been enhanced to 75: 25 (Centre: State). The funds for training under the CADWM Programme are provided to meet the operational cost of the training courses and cost of organising various activities but not the salary of the staff, which comes from State budget. However, the institution concerned can charge certain amount as institutional overhead. The programmes are to be organised in association with the State CADAs/ CAD agencies/departments and the funds are routed through them. Some of the activities, which can be funded under the State level programmes, are:

(i) Training of farmers and field functionaries

The State level training programmes are meant for middle and lower level functionaries of CADAs and the farmers of CAD project areas. WALMIs are in particular responsible for organizing trainings of farmers and field level functionaries. There is large number of CAD Staff requiring up gradation and refreshment of knowledge about various aspects of Land & Water Management. The WALMIs/IMTIs and other agencies, therefore, need to prepare training plans on annual basis to train the CAD staff as well as the farmers.

(ii) Adaptive/action research and demonstrations

This is a continuing activity. However, as funding for these activities was on 50:50 cost sharing basis earlier, due to resource crunch State Governments accorded low priority to it. Keeping the importance of these activities the funding pattern has been enhanced to 75:25 between the Centre and the States. WALMIs in association with ICAR Research Centres and CADAs can play a major role in promoting this activity.

8.1.3 Monitoring and concurrent evaluation of CAD projects

The WALMIs and IMTIs can provide consultancy support to CADAs/State Governments in monitoring and concurrent/post evaluation of CADWM Projects.

8.1.4 Enforcement of Warabandi

The Command Area Development Authority does enforcement of Warabandi below the outlets as a core CAD activity. Integrated Water Management, including supply from the head regulator of main canal up to the farm gates, should be considered as a single objective. Effective coordination with the irrigation staff is necessary in working out operational plans for the main systems, which would be in conformity with the Warabandi schedules prepared below the outlets. Preparation of operation plans for the main canal systems in advance, taking into account the recommended sowing times of various crops, in Kharif and Rabi seasons should be attempted. Working out schedules for opening of the canal, restoring of the branches of distributaries for providing equitable water supply in various sub-commands and informing the farmers in advance need to be done. Co-ordination with the agriculture departments (extension as well as zonal research centers), who advise the most suitable dates of sowing of crops as well as crop sequences is also necessary for effective implementation of Warabandi. WALMIs can play a supportive role in this activity through action research programmes and training of farmers immediately after the new OFD works are completed. This activity has to be taken as a part of regular training programme for farmers and field functionaries.

8.1.5 Implementation of PIM in CAD projects

Apart from normal training programme for field functionaries and farmers, action research for PIM is now proposed to be entrusted to the WALMIs and other State/Central Institutions. It is to ensure that farmers will be encouraged to form Water Users' Associations and take over the on-farm development works, equitable management of water, crop management, issues on revenue collection, to maintain data and financial records. They will also be trained regarding maintenance aspects of the OFD works. The involvement of these institutes can be in the form of (i) preparation of Draft PIM Act (if not already done) by the State. In this regard the State may obtain help from WALMIs, NGOs or other State/Central organisations followed by the process of approval; (ii) awareness and motivation of the farmers in PIM activities. WALMIs can play major role in this activity (This activity of imparting awareness and motivating the farmers could be done simultaneously along with the other activities of implementation of PIM); (iii) necessity of bench marking and fixing targets on performance indicators; and (iv) constitution of State Level Committees for effective Appraisal and Monitoring of CADWM Projects.

Proforma for Quarterly Physical Progress Report for the quarter ending(Project-wise and State-wise)

Name of State _____

Name of Project _____

(All areas in th. ha)

S.No.	Item	Total quantum of work involved	Achievement upto end of previous financial year	Target for current financial year	Achievement of current financial year upto end of previous quarter	Target for the quarter of report	Achievement during quarter of report	Cumulative achievement of current year upto end of quarter of report	Target for next quarter	Rem-arks
1	2	3	4	5	6	7	8	9	10	11
1.	Survey, Planning & Design									
2.	Construction of field channels									
(a)	Unlined									
(b)	Lined									
(c)	Total									
3.	Full package OFD works									
(a)	With Unlined FCs									
(b)	With lined FCs									
(c)	Total									
2&3.	Total Field Channels[2 (c) + 3 (c)]									
4.	Construction of field, intermediate and link drains									
5.	Warabandi									
(a)	No. of outlets covered									
(b)	Area covered									
6.	Adaptive trials:									
(a)	No. of trials									
(b)	Area covered									
7.	Demonstration									
(a)	No. of Plots									
(b)	Area covered									

**Proforma for Quarterly Physical Progress Report for the quarter ending(Project-wise and State-wise)
Contd...**

S.No.	Item	Total quantum of work involved	Achievement upto end of previous financial year	Target for current financial year	Achievement of current financial year upto end of previous quarter	Target for the quarter of report	Achievement during quarter of report	Cummulative achievement of current year upto end of quarter of report	Target for next quarter	Remarks
1	2	3	4	5	6	7	8	9	10	11
8.	Training :	-								
(a)	No. of Senior Officers trained									
(b)	No. of junior Officers trained									
(c)	No. of farmers trained									
(d)	No. of training programmes									
9.	Formation of WUAs:									
(a)	Nos. of WUAs formed									
(b)	Area covered									
10.	No. of Monitoring & Evaluation Studies carried out									
11.	Waterlogged area reclaimed									
12.	Renovation & desilting of existing tanks									
(a)	No. of tanks covered									
(b)	Cumulative area of tanks covered									
13.	Correction of System deficiency									
(a)	No. of distributaries/ minors covered									
(b)	Total Command Area covered									

Proforma for Annual Progress Report for the year(Project-wise and State-wise)

Name of State :

Name of Project :
(All areas in th. ha)

S.No.	Item	Total quantum of work involved	Achievement upto end of previous financial year	Target for the year of report	Progress during the year of report	Cumulative achievement till end of the year of report	Target for the next financial year
1	2	3	4	5	6	7	8
1.	Survey, Planning & design						
2.	construction of field channels						
(a)	Unlined						
(b)	Lined						
(c)	Total						
3.	Full package OFD works						
(a)	With Unlined FCs						
(b)	With lined FCs						
(c)	Total						
2&3	Total Field Channels[2 (c) + 3 (c)]						
4.	Construction of field intermediate and link drains						
5.	Warabandi						
(a)	No. of outlets covered						
(b)	Area covered						
6.	Adaptive trials:						
(a)	No. of trials						
(b)	Area covered						
7.	Demonstration						
(a)	No. of Plots						
(b)	Area covered						

Proforma for Annual Progress Report for the year(Project-wise/State-wise) Contd...

S.No.	Item	Total quantum of work involved	Achievement upto end of previous financial year	Target for the year of report	Progress during the year of report	Cumulative achievement till end of the year of report	Target for the next financial year
1	2	3	4	5	6	7	8
8.	Training :						
(a)	No. of Senior Officers trained						
(b)	No. of junior Officers trained						
(c)	No. of farmers trained						
(d)	No. of training programmes						
9.	Formation of WUAs:						
(a)	Nos. of WUAs formed						
(b)	Area covered						
10.	No. of Monitoring & Evaluation Studies carried out						
11	Waterlogged area reclaimed						
12	Renovation & desilting of existing tanks						
(a)	No. of tanks covered						
(b)	Cumulative area of tanks covered						
13.	Correction of System deficiency						
(a)	No. of distributaries/ minors covered						
(b)	Total Command Area covered						

COPY OF SANCTION ORDER REGARDING CADWM PROGRAMME

No. 2-10/2001-CAD
Ministry of Water Resources
Government of India
(CADWM Wing)

Krishi Bhawan, New Delhi
Dated 25.2.2004

ORDER

Sub: Continuance of Command Area Development (CAD) Programme in a Restructured form to be called as "Command Area Development and Water Management" (CADWM) Programme in selected irrigation commands during the X Five Year Plan (2002-2007)

Sanction of the President is accorded to the (i) Continuance of the Command Area Development Programme on existing financing pattern, cost norms and condition of release as approved earlier vide letter no. 3-14/94-CAD dated 19th March, 1997 (copy as enclosed) for implementation during the first two years of the X Plan i.e. 2002-03 and 2003-04; and (ii) further continuance of the scheme during the remaining three years of X Plan (2004-05 to 2006-07) in the restructured form to be called as "Command Area Development and Water Management Programme" for an estimated cost of Rs. 4094 crore out of which the Central share is Rs. 1306 crore.

The following components of the programme shall stand deleted with effect from 1.4.2004:

- (i) Land levelling & shaping;
- (ii) Sprinkler & Drip irrigation;
- (iii) Conjunctive use of surface and ground water; and
- (iv) Crop compensation and introduction of suitable cropping patterns

The loan component of the programme shall be discontinued with effect from 1.4.2004.

The following new components shall be added to the programme with effect from 1.4.2004:

- (i) Correction of system deficiencies above the outlet upto distributaries of 4.25 Cumec (150 Cusec capacity);

- (ii) Renovation and desilting of existing irrigation tanks including the irrigation system and control structures within the designated irrigation commands; and
- (iii) Use of location specific bio-drainage techniques to supplement conventional techniques for reclamation of waterlogged areas

2. The restructured Command Area Development and Water Management Programme will be implemented with effect from 1.4.2004 with components, financing pattern, cost norms and condition of release as given below:

Activity	Financing Pattern (Central Share)	Cost Norms
1. Correction of System deficiencies above outlet upto distributaries of 150 cusec capacity (New Component).	50%	Rs 2000/- per ha or 50% of actual expenditure whichever is less as central assistance (assumed cost for Correction of System deficiency Rs.4000/- per ha)
2. Survey, Planning and designing of OFD Works (Ongoing Component).	50%	50% of actual expenditure on survey, planning and designing of OFD Works. (No change from IX Plan)
3. Construction of Field Channels (ongoing component). i) North Eastern States Himachal Pradesh, Jammu & Kashmir, Hilly areas of Uttranchal & West Bengal, Indira Gandhi Nahar Pariyojana of Rajasthan and other similar areas in the State, Kerala, Goa , DVC of West Bengal, Districts of Haryana & Punjab States bordering IGNP.	50% *	Rs.7500/- per ha or 50% of actual expenditure whichever is less as central assistance (the assumed cost of construction is Rs.15000/-per ha).
ii) For States and Areas other than given at item 3 (i) above.	50% *	Rs.5000/- per ha or 50% of actual expenditure whichever is less as central assistance (the assumed cost of construction is Rs.10000/- per ha).
4. Full Package OFD Works including Field channels, realignment of field boundaries,		

Activity	Financing Pattern (Central Share)	Cost Norms
land levelling/shaping (ongoing component with enhanced scope); i) For Hilly States/ Areas as mentioned in 3 (i) above	50% *	Rs 9000/- per ha or 50% of actual expenditure whichever is less as central assistance (the assumed cost for full package OFD works in hilly areas is Rs 18,000/- per ha).
ii) For plain areas	50% *	Rs 5000/- per ha or 50% of actual expenditure whichever is less as central assistance (the assumed cost for full package OFD works in plain areas is Rs 10,000/- per ha).
5. Construction of Field, intermediate and link drains (ongoing component with enhanced scope). i) North Eastern States Himachal Pradesh, Jammu & Kashmir, Hilly areas of Uttranchal & West Bengal, Indira Gandhi Nahar Pariyojana of Rajasthan, Kerala, Goa, DVC of West Bengal, Districts of Haryana & Punjab States bordering IGNP	50%	Rs.2500/- per ha or 50% of actual expenditure whichever is less as central assistance (the assumed cost of construction is Rs.5000/- per ha).
ii) For States / Areas other than given at item 5 (i) above	50%	Rs.2000/- per ha or 50% of actual expenditure whichever is less as central assistance (the assumed cost of construction is Rs.4000/- per ha).
6. Reclamation of waterlogged areas/ drainage - for all the States (ongoing component with enhanced scope to include bio-drainage)	50% *	Rs. 7500/- per ha or 50% of actual expenditure whichever is less for execution of surface drainage, bio-drainage etc. (total cost assumed @ Rs.15000/- per ha); and

Activity	Financing Pattern (Central Share)	Cost Norms
		Rs.20,000/- per ha or 50% of actual expenditure whichever is less where sub-surface drainage is envisaged (the total cost assumed @ Rs.40,000/- per ha).
7. Establishment (Ongoing component)	50%	20% of Expenditure on items at S. No. 3 (i) & (ii) / 4 (i) & (ii), 5 (i) & (ii) and 6.
8. Institutional support to Water Users' Associations (Ongoing Component)	270:270:60 ** (Centre: State: Farmer)	Rs 600 per ha in the ratio of 270:270:60 per ha. among Centre, State and Farmers (No change in old ratio of 225:225:50 on Rs. 500/- per ha).
9. Adaptive trials , demonstrations, action research , etc. through WALMIs and other institutions (ongoing component)	75%	As per location specific needs.
10. Training (ongoing component)		
(i) Courses for senior level officers sponsored by Central Government.	100%	As per location specific needs.
(ii) courses organized by States / Projects for officers, field functionaries and farmers etc. through WALMIs and other institutions.	75%	As per location specific need
11. Monitoring and Evaluation (ongoing component)		
(i) To be sponsored by Central Government	100%	As per need
(ii) To be sponsored by State Government	75%	As per need
12. Renovation and de-silting of existing irrigation tanks and control structures within the irrigated Commands (New Component)	50% #	Rs 7500/-per ha or 50% of actual expenditure whichever is less as central assistance (the assumed cost for renovation of

Activity	Financing Pattern (Central Share)	Cost Norms
		tanks is Rs.15000/- per ha)
<p>Note: * A minimum of 10% contribution (of the total cost) by the beneficiary farmers, as a part of the State share, is mandatory for these activities.</p> <p>**The institutional support is to be given where farmers associations are formed under PIM act or registered under Societies Act/ Cooperative Societies Act and actually engaged in distribution of water at the outlet level. A minimum of Rs 60/- per ha is to be realized from the beneficiary farmers.</p> <p># A minimum of 10% contribution (of the total cost) by the beneficiary farmers is necessary for this activity. This money shall be deposited in the accounts of WUAs as maintenance fund, the interest from which will be used for maintenance of the tanks and the system.</p>		

3. In addition to the objectives of the existing Command Area Development (CAD) Programme, the restructured programme must also ensure reduction of loss of irrigation water in the conveyance system and improve its efficiency at the farm level while ensuring equitable distribution of water. The programme must also help in building the capacity of Water Users' Associations.

4. Projectization is a key element of the implementation strategy and a proper DPR should to be made available to GOI for each project, with time frame, budget, action plan, deliverables and success criteria.

5. The activities under the restructured programme should be projectized and prioritized by preparing fresh project reports of ongoing projects incorporating balance OFD works, and new components i.e. correction of system deficiencies, drainage and renovation and desilting of MI tanks.

6. On-going projects should be prioritized and convergence with other schemes built into the projects. During X Plan priority should be given for completion of on-going projects. New projects will be taken up only in those States where all ongoing projects have been completed efficiently and effectively.

7. Central Assistance will be provided to states on enactment of PIM Legislation. Till this is done, alternative arrangements should be in place for formation and empowerment of Water Users' Associations.

8. Water Users' Associations should be in position before project components are taken up so that beneficiaries are involved in the projects since inception. Water User Associations should be formed immediately in on-going projects wherever this has not been done, before further funds are released.

9. Financing pattern for old components will remain unchanged from IX Plan. 10% (of the total cost) farmer contribution for select components (as described in table above) will be introduced from 2004-05.

10. No central assistance shall be provided for enforcement of warabandi, however, this being an important activity; its implementation should be continued by the State Governments.

11. While, rehabilitation/renovation of minor irrigation tanks is a part of the scheme, yet this component will be implemented only after other Command Area Development works are completed in given project.

12. The existing procedure for sanctioning new projects by an Inter-Ministerial Sanctioning Committee headed by Additional Secretary (WR) would be continued.

13. Other conditions relating to central release will remain the same as specified in various circulars issued from time to time. Detailed guidelines wherever necessary would be issued separately.

This issues with the concurrence of Finance Desk, Ministry of Water Resources vide their Dy. No.516/FD/04 dated 24.02.2004.

Hindi Version will follow.

Sd/-
(INDERJIT SINGH)
DEPUTY SECRETARY(CAD)
TELE: 23382481

Copy to:

- 1 Director (Cabinet), Cabinet Secretariat, Rashtrapati Bhawan, New Delhi.
- 2 Adviser (WR), Planning Commission, Yojana Bhawan, New Delhi.
- 3 Member (RM), Central Water Commission, Sewa Bhawan, R.K. Puram, New Delhi.
- 4 Joint Secretary (PF-II), Department of Expenditure, Ministry of Finance, North Block, New Delhi.
- 5 Joint Secretary & FA, Ministry of Water Resources, Shram Shakti Bhawan, New Delhi.
- 6 Commissioner (CADWM), Ministry of Water Resources, New Delhi
- 7 Chief Engineer (P&D), CW C , Sewa Bhawan, R.K. Puram, New Delhi.
- 8 All Chief Engineers of Field Units of CW C.
- 9 Director (Finance), Ministry of Water Resources, Shram Shakti Bhawan, New Delhi.
- 10 Controller of Accounts, Ministry of Water Resources, Shastri Bhawan, New Delhi.
- 11 Sr.JCs(CADWM), Ministry of Water Resources, New Delhi
- 12 Under Secretary (Budget), Ministry of Water Resources, Shram Shakti Bhawan, New Delhi.
- 13 Sr. PPS to Secretary, Ministry of Water Resources, Shram Shakti Bhawan, New Delhi.
- 14 PS to Additional Secretary, Ministry of Water Resources, Shram Shakti Bhawan, New Delhi.
- 15 State Secretaries in-charge of CAD Programme (as per list)
- 16 Administrators/ Commissioners/ Directors of CAD Authorities (as per List)
- 17 Guard File/Sanction Folder.

(Enclosure to letter No. 2-10/2001-CAD dated 25.2.2004)

No.3-14/94-CAD(Pt.)
Government of India
Ministry of water Resources
Command Area Development Wing

New Delhi – 110001
Dated the 19th March, 1997

Sanction of the President is hereby accorded for continuation of the centrally sponsored scheme of Command Area Development Programme (CADP) during Eighth Five Year Plan at an estimated cost of Rs.2218.64 crore (Center's share is Rs.665.00 crore) subject to the following conditions :

1. The expenditure on the scheme during the Eighth Five Year Plan will be strictly within the Plan outlay approved by the Planning Commission.
2. The financing pattern to be followed with effect from 1st April, 1996 is detailed Below :-

Sl. No.	Item/Activity	Financing Pattern
A. GRANTS :		
1.	Establishment, Surveys, Planning, Designing and Supervision of OFD Works. (NOTE: The Establishment Cost is to be restricted to 20% of the total expenditure under work items only (i.e.) (i) Construction of Field Channels ; (ii) Construction of Field Drains (iii) Warabandi and (iv) Reclamation of Waterlogged areas).	50%
2.	Warabandi	50% (This will also cover expenditure on Wireless communication system)
3.	Crop Compensation	50% of 2/3 value of crop.
4.	Adaptive Trials, Demonstration and Training.	50%
5.	Subsidy for small and marginal farmers on IRDP pattern on identical items.	50% (To be adjusted against loan on identical items)
6.	Construction of Field Channels holding.	50% of the cost from outlet to holding.
7.	Construction of Field Drains	50%

8.	Management subsidy for Farmers Associations. Note : to be given where Farmer's Association are formed, registered and actually engaged in distribution of water at the outlet level. The amount would be required to be deposited in the bank and interest accrued on this deposit will be used for the activities of the Associations).	Rs. 500 per hectare as one time functional grant(Rs. 225 per ha by Centre, Rs.225/- per ha by the State and Rs. 50/-per ha by the farmers.
9.	Orientation Training for Senior level officers sponsored by Central Government.	100%
10.	Evaluation Study i) To be sponsored by States ii) To be sponsored by Central Government	50% 100%
11.	Reclamation of Waterlogged areas (Note : To be given for irrigation waterlogged areas only)	50%

B. LOANS

1.	Equipment and Machinery	50%
2.	Equity support to Land Development Corporation and Farmers' Service Societies etc.	50%
3.	Special Loan Account for financing ineligible farmers for execution of OFD works.	

Release of central assistance for major components like construction of field channels, field drains, warabandi and reclamation of waterlogged areas would be regulated by the cost norms as detailed below :

i) Construction of field channels :		
a)	For N.E states Himachal Pradesh, Jammu & Kashmir, hilly areas of Uttar Pradesh and West Bengal and Indira Gandhi Nahar Pariyojana of Rajasthan.	Rs.5000 per ha or half of actual expenditure whichever is less. (The cost of construction is Assumed Rs.10,000 per ha.
b)	For States other than given at (a) above	Rs.3000/- per ha or half of actual expenditure whichever is less. (The assumed cost of construction is Rs.6000 per ha)
ii) Construction of field drains :		
a)	For N.E. States, Himachal Pradesh, Jammu and Kashmir, hilly areas of Uttar Pradesh and West Bengal and Indira Gandhi Nahar Pariyojana of Rajasthan.	Rs.1000 per ha or half of the actual expenditure whichever is less (Total cost estimated Rs.2,000/ha)
b)	For States other than mentioned in item No. (a) above.	Rs.500/- per ha or half of the actual Expenditure whichever is less. Total cost estimated Rs.1000/ha).

iii) Enforcement of Warabandi.

The central assistance will be made available @ Rs.150.00 (Rupees one hundred fifty only) per hectare or half of the actual expenditure, whichever is less. (Total cost on warabandi assumed @ Rs.300 per ha) uniformly for all the areas in the country.

iv) Reclamation of Waterlogged areas :

- a) The central assistance will be made available at Rs.6000.00 (Rupees six thousand only) per hectare or half of the actual expenditure, whichever is less. The remaining half will be borne by the State Government.

Main items of work under this scheme would be :- (a) Assessment of problem areas in the commands of irrigation projects ; (b) Prioritisation for their reclamation ; (c) Taking up the preventive and remedial activities; and (d) monitoring evaluation and dissemination of information.

The cost of survey, planning and reclamation of waterlogged areas would vary from place to place and the same would be decided as per the requirement of the project. However, an average cost is estimated to Rs.12000/- per ha of which half of the cost would be shared by the Central Government and remaining half would be borne by the State Government.

4. No new project would be generally included under the CAD Programme unless the concerned State Government gives an undertaking to the effect that steps have been initiated to form Water Users' Associations and the system would be concurrently handed over to the Association as soon as it is established.

5. No additional staff is to be created for monitoring of the CAD programme at the Central Level.

6. The existing procedure for sanctioning new projects by an Inter-Ministerial Sanctioning Committee headed by Additional Secretary (WR) would be continued.

7. In case of North Eastern States, Jammu and Kashmir and Himachal Pradesh minor irrigation schemes or a cluster of minor irrigation schemes having CCA of less than 250 ha would also be included under the Programme, provided the concerned State does not have adequate number of Projects under the CAD Programme.

8. Funds for reclamation of waterlogged areas will be released only for reclamation of waterlogged areas in the commands of CAD Projects and there should be no duplication with the scheme being implemented by the Department of Agriculture or any other department.

9. Other conditions relating to central release will remain the same as specified in various circulars issued from time to time. Detailed guidelines wherever necessary would be issued separately.

10. A comprehensive study on the impact of the Programme and measures for its effective implementation is required to be carried out, which inter-alia, will also ascertain the actual percentage of establishment cost which could form a basis for fixing the ceiling for establishment cost during the IX Plan.

11. A view regarding continuation of the Programme during the Ninth Plan would be taken only after the results achieved there under in the Eighth Plan are evaluated.

12. This order issues with the concurrence of Finance Desk, Ministry of Water Resources vide their Dy. No. 461/Dir(F)/97 dated the 12th March 1997.

Sd/-
(L.M. Gupta)
Director (CAD)
Tele : 3382481

Copy to:

- 1 Cabinet Secretariat, with reference to their letter No. 4/CM/97(i) dated the 29th January, 1997. (Shri D.M.M. Rao, Deputy Secretary) .
- 2 Controller of Accounts, Ministry of Water Resources, Shastri Bhawan, New Delhi.
- 3 Ministry of Finance, Department of Expenditure, Plan Finance Division, New Delhi (2 copies)
- 4 Adviser (I and CAD), Planning Commission, Yojana Bhawan, New Delhi.
- 5 Joint Secretary (CAD), Ministry of Water Resources, Shram Shakti Bhawan, New Delhi.
- 6 Financial Advisor, Ministry of Water Resources, Shram Shakti Bhawan, New Delhi.
- 7 Finance Desk, Ministry of Water Resources, Shram Shakti Bhawan, New Delhi.
- 8 B&T section Ministry of Water Resources, Shram Shakti Bhawan, New Delhi.
- 9 All Sr Joint Commissioners/ Joint Commissioners / Deputy director (AE)/ P.S. to Joint secretary (CAD)/ CAD Section
- 10 Secretaries in-charge of CAD Programme in States/ UTs
- 11 Administrators and Commissioners of CAD Authorities and Chief Engineers of CAD projects in the States
- 12 File No. 21-3/93-FD.

Annexure- IV

FORMAT FOR SUBMISSION OF DETAILED PROJECT REPORTS (DPRs)

For a systematic development of the Command Area, it is essential to prepare a comprehensive project report of all the activities to be taken up under the Command. Earlier this Ministry had issued guidelines for formulation of project reports for inclusion of new projects vide letter no. 15-1/90-CAD dated 19th April 1990. Under the restructured CADWM Programme, it has been decided that with effect from FY 2004-05 for a period of three years during X plan and beginning each future Five Year Plan, all State Governments will be required to submit a fresh project report in respect of all continuing or new projects as the case may be for assessment of the works already completed and left out, assessment of the physical and financial progress made so far, availability of financial resources during the Plan Period, prioritisation of the works proposed to be taken up during the Plan period, status and extent of the Participatory programme in the State/Projects, level of involvement of the WUAs in paying requisite contributions for execution of works, and possibility of handing over of the system to them.

The objective of the detailed project report shall be:

- a. To provide in-depth analysis of the past efforts,
- b. To evaluate the works done so far and to identify the constraints,
- c. To adopt a holistic approach to the future development of the CAD infrastructure
- d. To involve farmers at all levels,
- e. To complete all CAD activities in only those outlet commands where WUAs have been formed and are effective,
- f. WUAs are willing to take over the system – MOU signed in this regard
- g. Willingness of the State irrigation Departments to hand over the system to the Distributaries Committees after completion of corrective measures in distributaries,
- h. Evolution of suitable and sustainable measures for O&M of the distributaries and the micro level infrastructure
- i. All activities under the outlet command to be taken up in an integrated manner and release to be made only after all the works in the outlet are completed.

The format Project Report shall be as under:

I. CONTENTS OF THE PROJECT REPORT

This should have three columns viz.; Serial No., Particulars and page No.

II. CHECK LIST

To be given at the beginning of the project report after index

- a) Whether salient features of the project have been enclosed at the beginning of the report
- b) Whether details of the Canal Command viz; distributory-wise /minor-wise details of outlets to be covered under the programme together with relevant maps and other details have been included under salient features of the project
- c) Whether the project has been cleared by the Planning Commission (except in case of minor irrigation schemes)
- d) Whether more than 60% irrigation potential has been created in the project
- e) Whether the State Government has approved the project for inclusion under CADWM Programme (Applicable in case of new projects being proposed for inclusion under CADWM programme) -
- f) Whether Plan provision has been made in the State budget for providing matching share -

III. SALIENT FEATURES OF THE IRRIGATION PROJECT SHALL INCLUDE:

1	Location - Name of River basin, Tributary, Irrigation project, headwork.									
	Type of dam, barrage etc.									
2	Canal Network:									
	A. Main and Branch Canals									
	Canal	Name	CCA (Th. Ha.)	Discharge at head (Cumecs)	No. of direct outlets	Length (Km.)	Portion Lined (km.) (%)	Portion unlined (km.) (%)	No. of days of running on full discharge	Weather volumetric devises/- discharge measuring structures exist on the canals
	Main	1. 2.								
	Branch	1. 2. 3. 4.								
	B. Distributaries/ Minors/ Sub-minors									
	Canal	Total Length in Km.		Portion Lined (km.) (%)		Portion unlined (km.) (%)		Weather volumetric devises/discharge measuring structures exist		
	Distributaries									
	Minors									

3	Hydrology of Catchment:							
	Catchment Area (Sq. Km.)	Average Rainfall (mm)	Average Annual flow with years of assessment MCM	75% dependable yield (Design) MCM	75% yield (present) MCM	Catchment Ground water yield (MCM)	Total yield MCM	Has the yield been affected due to upstream development – if so details.
4	Storage:							
	Year of first impounding	Gross (MCM)	Dead MCM	Live (MCM)	FRL (m)	Extent of Evaporation losses MCM (% of present yield)	Average Rate of siltation MCM/year	Weather rules of operation exists
5	Give details of rules of operation:							
6	Give no. of structures provided at the time of construction on all canals.							
7	Has the project been revised at any time: Give details							
8	Has modernisation of the project/ canal been under taken at any stage / give details.							
9	If yes, repeat information 1 to 5 for the modernisation project.							

IV. SALIENT FEATURES OF THE CAD PROJECT.

1	Name of the CAD project. (Whether new/continuing - Year of inclusion if continuing).	
2	Name of State and CADA implementing the Project.	
3	Name of State, Districts and Blocks served by the Project Command. District wise area served by the Command in thousand hectares.	
4	Name, designation, address, phone, fax and e-mail of : a. Secretary level b. Chief Engineer level c. Administrator CADA d. SE level officers e. Organizational Structure	
5	Financial source of the project at State level – Whether State funds or through loans or through corporations.	
6.	Estimated cost of the CAD project as originally envisaged at the time of inclusion under CAD programme.	
7	Has the CAD project executed through Foreign assistance at any stage wholly or partly? If yes details.	
8	Area served by the Command in Th. Ha.:	
	Gross Area of the Irrigation Project (Design)	
	CCA of the Irrigation project (Design)	
	Ultimate Irrigation Potential (Design)	

	Irrigation Potential created at the time of Inclusion under CADP								
	Irrigation Potential utilised at the time of inclusion under CADP								
	CCA/IP	At Inception	Area covered upto end of IX Plan	CCA covered during 2002-03	CCA being covered during 2003-04	Target 2004-05	Target 2005-06	Target 2006-07	Target 2004-07
	CCA included under the CADP								
	Irrg. Potential created.								
	Irrigation Potential utilised								
	Approximate year during which the irrigation potential is likely to be fully utilised.								
9	Physical Progress/Targets details (Th. Ha):								
	Activity	As per Design Report	Area covered upto end of IX Plan	CCA covered during 2002-03	CCA being covered during 2003-04	Target 2004-05	Target 2005-06	Target 2006-07	Target 2004-07
	Field Channel (at least 20% lined)								
	Field Drain								
	Wara-bandi								
	Land Levelling								
	Correction of system Deficiencies								
	Rehabilitation of existing MI tanks								
10	Financial Progress/ Targets (Rs. Lakh):								
	Estimated Cost (latest) with year	Expenditure incurred upto end of IX Plan	Expenditure incurred during 2002-03	Expenditure incurred during 2003-04	Estimated Cost of balance CAD Works and Likely year of Completion	Cost 2004-05	Target Cost 2005-06	Target cost 2006-07	Target cost 2004-07
	State								
	Central								
	Total								
11	Intensity of irrigation (Crop season wise and annual)								

	(a) As projected in project Report (b) As envisaged after CAD								
12	Cropping pattern (Area/Percent of CCA):								
	Crop name	As envisaged in the Project Report				Present			
		Kharif	Rabi	Perennial	Total	Kharif	Rabi	Perennial	Total
	Total								
13	Whether consolidation of holdings would be necessary, if so, is there an enabling/ compulsory legislation. Status of consolidation of holdings in the State.								
14	Is it proposed to set up a new Command Area Development Authority (for new projects), if so. (a) The year by which this would be done. (b) What is likely level of appointment to the post of Administrator/Chairman. (c) Proposed Organisation structure.								
15	Area affected by waterlogging (ha.)/ salinity/alkalinity and indicate the norms for taking areas under waterlogging (enclose depths to groundwater map) a. any projects been taken up in the past? If so provide details of works included and completed, estimated cost and present expenditure. b. Extend of balance area to be covered. c. Area proposed to be covered during X Plan (2004 -07).								
16	(a)Range of other activities to be undertaken under the CAD programme (please indicate yes or no) i) Consolidation of holding ii) Roads iii) Regulated markets iv) Modernisation of the system v) Processing industries vi) Change in cropping pattern/ practices vii) Intensive Agriculture Extension viii) Other (Specify) (b)Present status of above CAD activities.								
17	Information regarding small/marginal farmers: a. Total CCA b. Area held by marginal farmers (upto 1 .00 ha.) c. Area held by small farmers (upto 1.01 to 2.00 ha.) d. Percentage of marginal holdings to total number of holdings e. Percentage of small holdings to total number of holdings.								
18	i) What is the percentage (of total population of Scheduled Tribes in the command area ii) What is the percentage (of total population of								

	Scheduled Castes in the command Area.	
19	Whether irrigation component of the Project has been cleared by Planning Commission, if so the letter no. and date of clearance.	
20	Whether CAD component of the Project has been cleared by Planning Commission, if so date of clearance.	
21	Whether provision for taking up of the project has been made in the 10 th plan.	
22	Whether the project report along with the related maps has been enclosed or not along with above data.	
23	Total time required for completion of CAD Project	
24	Cost of the CAD Project as proposed and year-wise and Plan-wise phasing of expenditure.	

V. TEXT OF THE REPORT

Chapter 1

INTRODUCTION

Introduction would cover broadly the location of the project area. The general topographical details relating to hilly areas or rivers or the drainage lines may also be included. This chapter would also highlight in brief the need of taking up the particular activity and the overall cost estimates and phasing of works.

Chapter 2

PROJECT DETAILS

This Chapter would briefly give the data on the following aspects:

- i) General details of the area viz. geographical area district-wise gross area and culturable command area, etc.
- ii) Physiography covering (a) climate, rainfall, location of rain gauge stations, equipments installed (b) temperature – maximum, minimum of all zones of project area with data (c) mean wind speed and their variations and (d) mean relative humidity. Other specific data relating to physiography may also be included.
- iii) Rivers, drainage systems and other details of relief of command area. The availability of outfalls may be discussed in detail.
- iv) Topography giving general details of country slopes as related with the irrigation slopes for flow or lift irrigation, land specific features of general topography.
- v) Soil survey details as per available data, methodology used for soil surveys, soil series, soil irri-gability and land-capability classification, soil maps as available. The suitable details indicating the fertility status of the soils and remedial measures for covering their deficiencies. Number and location of soil testing laboratories as available may also be given.

- vi) General water availability giving hydrological conditions of the area, ground water, monitoring details such as depth of ground water, ground water fluctuation maps indicating the position obtained before the introduction of irrigation, /analysis of data for the assessment of rising/depleting trends of ground water, quality of ground water along with details of the area under various limiting values of salinity and alkalinity indicators. Number and locations of water testing laboratories may also be given.
- vii) Socio-economic status covering data on population, households, workers – rural/urban and literacy status etc.
- viii) Land holding, land tenure and farm economy giving details of land holding series, frequency distribution, land values and tenures; and farm budget analysis dealing with farm income and expenditure on irrigated and un irrigated holdings.

Chapter 3

AVAILABLE WATER RESOURCES AT PROJECT HEAD

This chapter should give details of usual water availability at the project head in Kharif and Rabi seasons in normal rainfall year and the deficit rainfall year, the average and 75% annual and monsoon dependable flows as given in the project report and at present. Canal-wise details of allocation of water for irrigation at the head may be given.

Chapter 4

STATUS OF CONVEYANCE SYSTEM

This chapter should contain details relating to status of the existing conveyance system giving inter-alia details of existing deficiencies, which are hindering the water use efficiency, frequency of the O&M works, availability of funds for O&M, participation of Water Users' Associations etc. in the O&M activities. Details of potential created and utilized, other performance indicators, existing and proposed benchmarks may be given. Information on volumetric assessment of water at prominent points along with a map may also be provided. Has any study on seepage and other losses been made in the past, if so, provide details.

Chapter 5

IRRIGATION DEVELOPMENT OF COMMAND AREA

This chapter would highlight the project provisions in the sanctioned project estimate with reference to the intensity of irrigation to be achieved, cropping pattern adopted and the operation plan. Also it will discuss the development of irrigation in the command during the period of construction till its proposed inclusion, cropping

pattern adopted and operation plan being followed. This chapter would broadly cover: –

- (i) Source of irrigation available in the command area,
- (ii) Details of irrigation network,
- (iii) Design/envisages flows in the system,
- (iv) Details of the network and gross area and culturable command area covered under each system,
- (v) Distributory-wise name of the outlet and their discharge and CCA,
- (vi) Status of linking of channel and construction of structures such as head works, bridges, escapes etc. on the alignment.
- (vii) Operational details of the system including rotational programme of various channels with discharges,
- (viii) Water account of all the distributaries/minors and its comparison with the design data, discussing the designed and achieved intensity of irrigation,
- (ix) Deficiencies in the supplies,
- (x) The system constraints and proposed action for taking remedial measures; and
- (xi) Cropping pattern designed in the Project estimate Region-wise.

Chapter 6

STATUS OF ON-FARM WATER MANAGEMENT SYSTEM

This chapter should contain details of prevailing On–Farm Water Management practices, need and the strategies to be adopted to bring about a switch over from the traditional and less efficient water management practices to improved and better water management practices in the command area.

Chapter 7

CROPS AND CROPPING PATTERN

This chapter would give the details of pre-project cropping pattern, present cropping pattern and cropping patterns to be promoted in future with a view to improve water use efficiency and increase production, productivity and income of the farmers.

Chapter 8

PROJECT OBJECTIVES AND PROPOSED WORKS

This chapter would highlight the details of the potential creation and utilisation with future targets. The details of the works proposed to be taken up for optimum utilisation of created potential and increase in agricultural productivity may be detailed. The works may include:

- i) Correction of system deficiencies
- ii) Construction of field channels/full package OFD works/ Underground pipeline
- iii) Field drainage
- iv) Warabandi
- v) Ground Water Development/conjunctive use
- vi) Adaptive trials and demonstrations and other agricultural extension activities
- vii) Renovation Minor irrigation Tanks
- viii) Formation of Water Users' Associations
- ix) Monitoring and Evaluation
- x) Training of farmers and technical staff
- xi) Mechanism for maintenance of OFD works
- xii) Any other work considered essential for development of command area including infrastructural facilities such as rural roads, market centres, rural go downs etc. through convergence with other schemes

All the items taken up for execution should be documented in details covering total assessment of work and line of action for taking up these activities in a systematic manner.

Chapter 9

STATUS OF DRAINAGE SYSTEM - WATERLOGGED AND SALINITY/ALKALINITY AFFECTED AREAS AND CONCEPT OF BIO DRAINAGE

This chapter would identify all the areas affected with Waterlogging land salinity/alkalinity/proper assessment of these areas and their remedial measures may be given in details. This chapter may also include the findings of research institutions or agriculture universities and pilot studies as related with this subject.

Chapter 10

STATUS OF EXISTING MINOR IRRIGATION TANKS WITHIN THE COMMAND

This chapter should give complete status about Minor Irrigation Tanks including irrigation system and control structures existing within the command such as area originally commanded by the MI tank, area under irrigation now, status of conveyance system, the benefits that are likely to accrue as a result of renovation, whether farmers are willing to form Water Users' Associations and contribute 10% of the total estimated cost of renovation towards maintenance fund.

Chapter 11

ORGANISATION MANAGEMENT AND EXECUTION

a) Organizational Set up

This part would cover the proposals of the State Government for setting up the suitable CAD Authorities with the details of its Board of Directors (if not already done). The organizational set up at both State level and Project level may be given in detail.

b) Implementation schedule and cost estimates

This part would cover the assessment of workload under each activity to be taken up, specification of all the works in brief and cost estimates of the works and their phasing. The phasing should cover both the physical and financial aspects.

Chapter 12

TECHNICAL DETAILS OF THE WORKS TO BE CARRIED OUT – ACTIVITY-WISE AND DETAILS

This chapter should cover design aspects of OFD works and other activities such as design details of field channels including regulatory structures under a given soil and topographic situation, O&M works to be carried out for correction of system deficiencies, design details of works for reclamation of waterlogged areas, renovation work to be done in case of MI tanks etc.

Chapter 13

PARTICIPATORY APPROACH TO IMPLEMENT THE PROGRAMME

This chapter should give salient features of PIM Act if already enacted in the State, the Status of formation of water Users' Associations, their viability and whether they are functional or not. If not functioning, reasons thereof and strategies being thought of for their revival.

Chapter 14

OPERATION AND MAINTENANCE

This chapter would highlight the existing set up dealing with operations and maintenance of the main canal system and delivery arrangements upto farmers holding and other OFD works. Legal status of provisions of regulatory Acts, methodology of achieving farmers' participation and collection of water charges etc. may also be detailed. Chapter may also provide details of rationalized structure of water charges as existing on date.

Chapter 15

AGRICULTURAL PRODUCTION AND INCOME, INFRASTRUCTURAL FACILITIES, FINANCING AND AGRICULTURAL CREDIT

This chapter would give the status of crop-wise areas irrigated being irrigated during pre-project and post- project periods. On development of irrigation shifts in areas from rain-fed areas to irrigated conditions may be given. The data on crop-wise yields for pre-project/post-project should be utilised for working out the additional production and benefits that would accrue on full irrigation development. Methodology of crop cutting experiments to be conducted in the irrigated agriculture be also discussed.

The portion on infrastructural facilities shall include:

- (i) Agricultural supporting services, (a) inputs viz seeds, fertilizers, pesticides etc. (b)T&V system of agricultural extension and (c) Agricultural Research indicating the list of Agriculture Universities, other research demonstration Institutions and extension education facilities as available
- (ii) Roads
- (iii) Market centers.
- (iv) Other miscellaneous services such as plant protection, horticulture, soil and water testing, agro industries and other small/marginal farmers development agencies etc.
- (v) Liaison with allied departments/institutions like WALMIs, Agriculture Universities and Departments, Research Institutes like ICAR and other rural development institutes in the area be discussed.

The portion on financing shall include details of mode of financing of the project. This will include the funds as made available by State, Centre and other Institutions. The details of accounting procedure to be adopted may also be indicated.

The portion on Agricultural Production – shall include the information on facility available for agricultural credit from various banks for proposed activities etc. The mechanism for arranging short and long term loans/credit to small/marginal farmers and other farmers may also be detailed.

Chapter 16

CONVERGENCE OF THE CADWM PROGRAMME WITH PROGRAMMES OF OTHER MINISTRIES

Various other Ministries of Government of India such as Ministry of Agriculture and Ministry of Rural Development are operating programmes/schemes, which have components relating to on-farm water management, ground water development, renovation of tanks etc. The provisions of such schemes can be used/dovetailed to benefit the farmers. Some of the schemes are mentioned below:

Schemes of Ministry of Agriculture:

- a) On-Farm Water Management for Increasing Crop Production In Eastern India
- b) Development of Horticulture through Plasticulture Interventions

Schemes of Ministry of Rural Development

- a) Swajal Dhara – Drinking Water Sector and Hariyali – initiative in watershed development to strengthen role of Panchayati Raj Institutions in development process.
- b) 2.Safe Drinking Water to all in rural sector by 2004 plan –outlay – Rs.14200 crores, 12.80 lakh habitations already covered. Only 15444 (1.09%) rural habitations yet to be covered.
- c) 3.Desert Development Programme (DDP), Drought Prone Area Programme (DPAP) and Integrated Wasteland Development Programme (IWDP) - Area Under Treatment – 87.12 Lakh Hectares.
- d) 4.Central Rural Sanitation Programme (CRSP)

Chapter 17

MONITORING AND EVALUATION

This chapter should contain details of the State Level Committee set up by State Government in accordance with the provisions of the guidelines so as strengthen the monitoring of the CADWM Programme and thereby bring about a qualitative improvement in the implementation of the programme. It may also include details of information being compiled and mechanism of dissemination. This chapter may also include all evaluation studies done so far, whether for the project as a whole or for specific component of the project with details of the findings thereof.

Annexure to DPRs

The Project Report should be accompanied by suitable annexures to each chapter and data/drawings relating to canal irrigation system, project areas, annual rainfall and coefficient of variations, soil maps, ground water quality and fluctuation maps and other typical designs and specifications.

VI. ATTACHMENTS

1	Please attach the following on a suitable scale:- a. Catchment Area map of the Project showing all upstream works affecting the flow into the reservoirs. b. Attach full command Area maps showing all details of canals, branches, distributaries, Minors and outlets c. Attach maps in parts if the command is too large.
2	Provide a map of canal, branches, and distributaries, outlets with area commanded by each upto outlet level. Clearly indicate the outlets already saturated.
3	A map showing water logged areas within the command

**GUIDELINES FOR SUBMISSION FOR PROPOSALS FOR
RECLAMATION OF WATERLOGGED AREAS UNDER CENTRALLY
SPONSORED COMMAND AREA DEVELOPMENT PROGRAMME**

A component of "Reclamation of Waterlogged area in the irrigation commands" has been included under the Centrally Sponsored Command Area Development Programme since April 1996. The main objective of this component is to reclaim waterlogged areas, caused either on account of surface flooding/inundation or due to rise in water table so as to put back the degraded land for optimum productivity. Hence, it is felt that the process of reclamation should be easy, economic and feasible and projects may be prepared accordingly. Broadly, the project should be compact in nature and should give immediate benefit to the farmers. However, the broad guidelines are given as under:

- a) A Map of the individual project on a suitable scale may be prepared giving the command of the minor / distributary.
- b) Specific location be indicated in a larger map and subsequently the details of the project be brought in the bigger map of its own.
- c) Give Agro-climatic details like soil, salinisation, crops being grown, rainfall, temperature etc. in the area.
- d) The problem – It should indicate the cause of waterlogging, extent of waterlogging, type of waterlogging (surface flooding or rise in water table)(area having water table between 0-2 m b.g.l., 2-3 m b.g.l. and more than 3 m b.g.l.).
- e) Loss to crops in Kharif, Rabi, summer – in quantity and quality.
- f) Other problems – disturbance in eco system, diseases and pests etc., public inconveniences.
- g) Present preventive and remedial measures being taken up.
- h) Constraints.
- i) Preventive and remedial measures proposed – give full details.
 - a. Cost estimates.
- j) Justification of the project and B.C. ratio.

Though for reclamation process, detailed survey would be needed but administrative approval of the Central Government may be conveyed on the basis of certain minimum details which may be provided by the State Government. These details should invariably include points given in the enclosed format below:

1. Location:
 - i) CAD Project
 - ii) Distributary Command
 - iii) Minor Command

2. Causes of Waterlogging:
 - i) Seepage from canals
 - ii) Over irrigation
 - iii) Growing of water intensive crops
 - iv) Any other reason

3. Type of Waterlogging :
 - (a) Surface Flooding:
 - i) Depth of waterlogging
 - ii) Duration of waterlogging
 - iii) Crops grown
 - iv) Percentage loss due to waterlogging in Kharif, rabi and summer (give details)

 - (b) Rise in water table :
 - i) Water table below ground level at
 - Mid of monsoon
 - Post monsoon
 - December and January
 - Pre monsoon
 - Any other detail
 - ii) Loss due to rise in water table (give full details)

4. Side effects of water logging :
 - a) Secondary salinisation :
 - i) Electric Conductivity
 - ii) pH
 - iii) Exchangeable sodium percentage.
 - iv) Extent of loss to crops(give full details)

5. Present measures being taken for the management of the area :
 - i) Preventive
 - ii) Remedial (give full details)

6. Indicate whether drainage work has been taken up earlier (give full details) including the reasons as to why the drains are not functional and suggestions thereof.

7. Proposed measures for reclamation:
 - i) Estimated cost:
 - a) Cost of survey, Planning and design.
 - b) Surface drains
 - c) Sub surface drains
 - d) Bio drainage (give full details)

8. Agency which would work for the scheme and cost of establishment, supervision etc.
9. Whether 50% cost will be borne by the State Government; if so, indicate budget provision made for this work.
10. Whether farmers are willing to contribute 10% (of total cost of construction) towards State share on select items
11. Give justification of the project including B.C. Ratio, time schedule for completion of the project.
12. Indicate about the strategy to be adopted for upkeep of the drainage system / reclamation measures taken for effective functioning in future . Whether State Government proposes the formation of farmers drainage management Committee. Full details be given.

Proposals for Bio-drainage

The detailed guidelines for preparation of proposals for implementation of bio-drainage to the reclaim waterlogged areas in the CADWM commands are under preparation. In the mean while, if, the state Governments have any proposal for the same. The same should be vetted by forest/agriculture/horticulture department of the State assuring that no irrigation area is likely to be affected by the implementation of bio-drainage technique. Research in the area already undergoing and finalization of guidelines may take few more years.

GUIDELINES ON ADAPTIVE TRIALS

Background

1. With the introduction of irrigation, the farmers in the command areas are expected to switch over from the traditional low risk, low input and low yields crops grown in rain-fed conditions to high risk, high input and high value crops which would increase their income from irrigated farming. This would need a number of changes in crops, cropping sequences, appropriate sowing times of various crops so as to have optimum benefits from the precipitation, canal water and the groundwater available in the commands.
2. The farmers in India are, however, very cautious in introducing such changes as firstly, they have already evolved a most safe cropping pattern based on their age old experience about the rainfall pattern, the vagaries in the precipitation as well as moisture holding capacities of the soils. Such cropping pattern affords them a higher return with minimum risks. Secondly due to fragmentation, low yields and low incomes in the pre-irrigation project conditions, the financial capacities of the farmers are at the lowest level and even if they get convinced through agriculture extension, regarding application of recommended package of practices, they are hesitant to do so and prefer to go slow in this respect.
3. The irrigation water deliveries which are generally controlled by the Irrigation Departments, are in some cases still based on the policy of protective irrigation i.e. supplying irrigation water only to save the crops from wilting. The deliveries are designed and operated on duty concept or water allowance for 1000 acres which do not take into account water requirements of various crops accurately. The frequencies of water supplied are designed arbitrarily without considering the allowable limits of soil moisture depletion or water holding capacities of the soils, as a result the choice of growing a large number of sensitive crops on canals is reduced.
4. The new varieties released have high potential yields, but at the same time they are quite sensitive to water stress. Soils vary considerably in a given command particularly in respect of water holding capacities and available moisture content and hence the question of determining suitable frequencies of water supply needs to be examined in greater details in field conditions. Voluminous data is generated in the research farms, water management centres, etc. regarding the yield response to irrigation critical growth stages, when water needs to be given to the crops, but such data is based on the experiments where water is at the command of the users and can be applied whenever needed.

5. In public delivery systems, providing water to individual farmers as per the crops grown by them at critical stages and that too in precise doses as per the consumptive use is extremely difficult. It would also be cumbersome to adopt different frequencies for different crops, or in different types of soils i.e. having light, medium and heavy soils. Experience, however, shows that higher the frequencies, better is the response in increasing the yields. Increasing the frequencies would, however, depend upon the management efficiency and would be possible only if irrigation doses or "Delta" is reduced proportionately. This involves improved On Farm Water Management, preparing fields suitably for raising water, controlling system size etc. which would involve training, demonstration and education to the farmers as well as to management staff.
6. The agriculture production involves innumerable agencies and also a number of parameters such as irrigation management, agriculture, research, extension services, credit supplying organizations, supply of inputs and the factors such as soils crops, climate and the most important, the farmers who are expected to actually produce. The process of bringing about the desired changes is entirely dependent upon the inter-actions between the various agencies, as well as a healthy dialogue between the management and the users. In order to accelerate the process, a number of trials, research in the field conditions would be needed.
7. These experiments cannot be or should not be carried out on prototype, as the exact solutions are not readily available nor can be guessed in the first instance and even if they are known, the application on large scale would be difficult. Besides the improvements and the corrective measures as would be evolved during the trials can be tried out on small scale experiments quickly and thereafter analyzed so as to work out final solutions applicable as well as replicable in the entire command. It is, therefore, appropriate if the innovations, improvements as well as training of farmers are tried out on a small areas, which are representatives of the command and preferably in farmers field under the Adaptive Trials.

8. **Definitions**

Adaptive research implies evolution of suitable practices (after due modifications in the existing recommendations) to suit the conditions of farmers fields, based on the sound knowledge of particular aspects such as agro climatic conditions, land treatment, crops varieties, fertilizers schedules, irrigation practices and economic capabilities. It should also take into consideration changes in productivity before and after the modifications.

9. **Scope**

- i. To device and demonstrate irrigation practices suitable to farmers' field conditions as they are.

- ii. To identify cropping systems and crop sequences suitable to the physical environments and water availability, farmers' skills and their economic capabilities.
- iii. To identify farming practices that may fall short of optimum recommendation due to resources constraints, particularly with purchased inputs.
- iv. To induce the farmers for group action for maintenance of distributaries/minors/outlets, field channels and field drains, deciding the crop patterns and distributing water equitably in participatory manner.
- v. To analyze the results obtained and modify the programme, if necessary.
- vi. To device suitable recommendations for adoption by the water management, research and extension staff.

10. The Adaptive Trials could aim at :-

- (i) Improvement in water deliveries ;
- (ii) Agronomical practices; and
- (iii) Farmers training & involvement.

11. Improvements in water deliveries

Experiments regarding suitable frequencies which can be adopted considering the management efficiency for different seasons particularly rabi and hot weather can be tried out. These frequencies could be 21 days, 14 days, 10 days or 7 days rotations. The 7 days frequencies are always found to be beneficial to the sensitive crops but need more detailed experimentation in respect of using the water in small doses.

Increase in frequencies would involve light doses of irrigation which needs educating the farmers in respect of the advance On Farm Water Management so as to enable them to spread water thinly but uniformly over the field and to reduce deep percolation losses.

Rostering minors, outlets by running the distributaries minors and field channels at full capacities so as to reduce the transit losses and also to ensure adequate water supply in the tail reaches.

Evolve suitable water allocations, water allowances considering the rainfall precipitation, canal & ground water availability so as to utilize the water resources at optimal level. Proposing Kharif releases whenever storages are available or early gains in the diversion weirs, so as to increase the cropping intensity and irrigation utilization in the Kharif season. The early sowing leads to better germination and higher yields as well as early maturity, which leave adequate time for preparing the fields for the rabbi season. Demonstrating the use of siphon tubes etc. for diverting water from the field channels to the crops which would reduce the maintenance efforts of the micro-level system and also would ensure accurate system size in every compartment, borders, furrows so as to have uniform distribution of water in the fields.

12. Agronomical practices

Finding out suitability of new varieties of seeds released by the Agricultural Universities/Agricultural Departments in respect of cereals, pulses, oilseeds and other crops in the command, from the point of view of location specific conditions in the commands such as soils, climate, water availability, achievable frequencies etc.

Finding out suitable dates of sowing of different crops, considering the water availability so as to have optimal yields and also increase the cropping intensity.

Evolving a suitable crop calendar for command or sub-commands with a view to increase cropping & irrigation intensity.

Evolving appropriate package of practices particularly the fertilizers doses so as to match with the financial capabilities of the farmers and advise them regarding the most economical combinations of N.P.K. based on soil testing which would afford the farmers to have maximum return per rupee spent by them in the initial period of irrigation. This would enable them to raise their input level in subsequent years after getting some profits.

Evolving appropriate doses of pesticides for prevalent crops in the command/sub-commands.

Exploiting ground water & using them either by mixing with the canal water or separately for enabling higher frequency supply, necessary for sensitive and high valued crops as well as maintain water balance in the command.

Introducing new crops, which can be successfully grown in the Irrigated Agriculture, which would give high profits to the farmers.

13. Farmer's training and involvement

Mechanism for involving the farmers for sharing water within the groups as well as maintenance of field channels and field drains below the outlets.

Demonstrations showing the use of siphon tubes or canvas dams for regulating water in the fields.

Educating the farmers in the water measurements and water accounting with a view to finally handover the water distribution to the farmers' association by supplying water in bulk to the farmers groups.

Optimum size of farmers association and the functions as well as responsibilities which can be entrusted to them in water management and maintenance as well as collection of water taxes.

14. **Methodology**

- (i) Selection of Operational Area :
The area for adaptive research-trials should be atleast $\frac{1}{2}$ to 1 per cent of the project area; which should represent the characteristics viz., climate, size of holding soil type and topography of the command areas. Smallest unit of operation should be a chak-outlet.
- (ii) The number of chaks will depend upon the total area selected in the command.
- (iii) Warabandi (RWS) system of a scheduling of irrigation is a pre-requisite for the operational area. However, if warabandi system is not in existence, it should be initiated prior to conduct the adaptive trials.
- (iv) Majority of the farmers from the operational area must be willing to participate in the programme.
- (v) Large number of water management projects were taken up earlier in order to find out the norms for O.F.D. works & lining of field channels etc. These projects were taken up so as to evolve the methodologies as well as evolve construction material standards and work out minimum improvements necessary in this subject. Number of projects had also experimented on the lining aspects of carrying out experiments with different materials for reducing the seepage losses, durability and cost of living, similarly some projects have also done valuable work in finalizing the designs for the O.F.D. structure and also have standardized the norms as well as designs and construction methods. By now voluminous data is already generated in these pilot water management projects & hence the adaptive trials need not repeat these items. Monitoring in this regard, however, may be necessary.
- (vi) Similarly purely agronomical trials such as mini-kit trials full package trials for small and marginal farmers are generally carried by the agriculture department or Extension Services and need not be repeated by us in the Adaptive Trials. However, we should have close coordination with the Agricultural Deptt. & try to incorporate the results of these mini-kits in working out the adaptive trials.

15. **Costs**

Whenever improvements in water management or scheduling of irrigation through Warabandi is thought of, there is a general feeling that for implementing all these schemes, the system would need modernization so as to update the existing system to the new standards which generally includes, lining of field channels for higher conveyance efficiency as well as increasing capacities, provision of adequate controlling structures perfect land leveling. No doubt, the upgrading of the system would be ideal for carrying out such trials

but it is felt that there is a large scope for improvisation of the irrigation deliveries by improving only the management services and constantly assessing the performance efficiencies of the irrigation system and planning the releases in a more systematic way. Once the irrigation management is improved and the farmers are trained and educated to use water economically, so as to optimize the benefits from the existing system after assuring a guaranteed supply of water utilization, there would be a demand from the farmers for updating and further improving the system. The modernization at this stage would have a better pay off and early returns but it would not be very correct to wait indefinitely till the upgrading is done.

Therefore, at the present stage we need not aim to have ideal as well as sophisticated system and try to concentrate as to how the present system could be more serviceable by improving the management.

Similarly, it is generally believed that for attracting the farmers to any new scheme and also involving the farmers in any project, it is essential to provide subsidy in water rates inputs or seeds. Such subsidies may attract the farmers in the initial stage but do not have the desired effects when the project is continued or extended for more than one year or two years and also extended in the remaining areas. Instead of subsidies prompt and efficient water services would maintain their interest permanently and they would be able to get high returns, which would gradually increase the inputs, which would lead to a permanent and steady impact on production.

The trials may, however, include costs for methods/tools/implements which are not commonly used by the farmers such as ridge former/sarayantra, for preparing borders or any other implements for preparing furrows procurement of siphon tubes, canvas dams which would be able to distribute water uniformly over the fields as well as afford ease in diversion of water from the field channel without any necessity of putting earth bunds which disturbs the regime of the channels.

In order to assess the crop water requirements and soil moisture status, pan Evapori-meter, rapid moisture meters and soil testing laboratory apparatus may be considered.

In case there is already a soil testing laboratory in the vicinity, the adaptive trials need not consider setting up a separate laboratory for the purpose but if the existing laboratory is over-loaded or at a remote place the trials may include provision of a small field soil testing laboratory to test the soils in respect of pH, electrical conductivity and N.P.K.

16. Monitoring and Evaluation

The principal objective of conducting adaptive trials is to give feed back to all the functionaries in the production programme through the irrigated agriculture

and hence the aims should be to keep data in such a way that it would lead to some guidelines for the managers of the canal system, researchers, extension officers and farmers as to how the whole system should be operated and run in subsequent years. The data needs to be analyzed at the end of every season and corrective measures as well as improvisation will have to be worked out and communicated to the different agencies and also for the purpose of preparing programmes for the next season in the Adaptive Trial area.

The data on accurate inflow/input of water in the adaptive trial area in respect of precipitation, the irrigation efficiency in the minors as well as field channels so as to indicate the actual water let out from the head regulator of the minor, water let out from different outlets and the actual water received at the fields are essential. This can be done by measuring the conveyance efficiencies of the minor and field channels on sample basis.

The crops grown in the adaptive trial area season-wise their inputs and yields showing the profit margin per ha.

Increase in the yields due to increase in the frequencies of water supply.

Adaption of different practices as recommended by the project officers and that implemented by the farmers.

Increase in the yields due to improved water management practices or On Farm Water Management such as borders, furrows, and the minimum delta which can be applied through this model irrigation methods.

Crops can be grown as per the normal frequencies of supply as adopted in the entire project and additional crops which can be grown with higher, frequencies in the adaptive trial areas.

17. Procedure

As indicated above an area of $\frac{1}{2}$ to 1 ha (1 to 2 acre) under each outlet may be selected which represent the command area in respect of soils, climate and landholding classifications;

The proposed innovations and experiments should be discussed with the farmers and if majority of farmers agree to implement the suggestions or advice given by the project officers then that area should be considered for continuing adaptive trials. The following procedure should be followed:

- (i) The soil should be tested for N.P.K., pH, and salinity and the deficiencies of ingredients work out.
- (ii) A crop plan should be prepared in consultation with the farmers which would fit in the initial stages within the water allocations & existing frequencies of the project

- (iii) Discussions should be held with the farmers about their capacities to spend for inputs for different crops and recommendations for the fertilizers inputs may be based on the soils analyzed and the deficiencies. Data in respect of response to crops yields at various levels of fertilizers is already available with the universities which can be made use of.
- (iv) Package of practices based on the soil testing should be adopted on part of the area leaving the balanced area as a controlled as per the normal practice of the farmers so as to indicate the difference in the yields and returns from the spending.
- (v) Improved water management practices should be tried out in some selected farms in the first instance to demonstrate its importance and ease in distribution of water uniformly throughout the fields.
- (vi) Efforts should also be made to show, how night irrigation could be possible if improved irrigation methods are adopted.
- (vii) The farmers may be persuaded to take new varieties which are found to be suitable and also full package of practices in small areas to demonstrate the potential yields which are achievable in the existing conditions.
- (viii) As regards the frequency trials, if the main canal is run continuously during the season, different frequencies such as 7 days, 10 days, 14 days, 21 days may be tried out on the given minor by special arrangements of releasing the water. If the main canal is not run continuously and is closed periodically as per the rotation and if the higher frequencies are not possible in a particular situation, some of the farmers having tubewells or dugwells may be persuaded to use the ground water to supplement canal water for high frequencies.
- (ix) The tools, implements and other material such as siphon tubes etc. may be issued to the groups of farmers for their use and not to the individual farmers.
- (x) For this purpose the Pipe Committee should be formed which can be negotiated for adoption of the improved packages of practices, irrigation methods, and distribution of the implements as well as tools/implements needed for the purpose

18. **Staffing pattern**

For each field unit of 1000 ha of operational area, the following staffing pattern is suggested.

- (a) Officer In charge (Agronomy) (Class I) - One
- (b) Agronomist (Class II) – One
- (c) Agril Engineer (Class II) – One
- (d) One Agril Assistant for every 100 ha area
- (e) Appropriate supporting ministerial staff

Adequate facilities for mobility should be provided. In Command area, where more than four units will be in operation, one coordinating unit be established at the headquarters. This Unit should be headed by Project Director from the discipline of Agronomy specialized in water management and crop production. The Project Director should be supported with agriculture economist and adequate ministerial staff with facility of mobility.

A committee consisting of CADA Officers/Agril. Extension/ Research programme Agricultural University and farmers representatives should be formed to prepare programme and monitor the activities.

The entire expenditure on the T.A. can be met with from the provisions under the Centrally Sponsored Schemes, which would be shared, by the State Govt. and the Govt. of India on 25:75 basis.

19. Procedure for submission of Proposals

The proposal will be first discussed in the State level monitoring committee and then will be forwarded to the regional offices of CWC. The CWC will examine the proposal in consultation with State Government / CAD Authority before consideration of Ministry of Water Resources for approval.

20. Bench Mark survey

Benchmark survey should be carried out by the adaptive research unit in respect of crop production level, crops & adopted varieties, intensity of cropping, fertilizer schedule, plant protection schedule etc. Formats for collecting data in respect of farmers under the command of outlets is annexed. Information should be completed outlet wise.

**ADAPTIVE TRIALS
(BENCH MARK SURVEY)
FORMAT FOR COLLECTING DATA**

SEASON:

Name of the Cultivator :
 Village :
 Minor No. :
 Outlet No. :

Information about land

1. Name of the Cultivator
2. Village
3. Minor No.
4. Outlet No.
5. Survey No.
6. Total Area ha
7. Cultivable Area ha
8. Waste Area ha
9. Area under well ha
10. Area under Channel ha
11. Type of soil
12. Slope of the land
 - (a) Main
 - (b) Sub
13. Depth of the soil
14. Information of soil analysis

N	%	P	%	K	%	Soil PH

Preparatory Tillage & Sowing

Particulars by	Recommended	Adapted Farmers
1. Previous crop		
2. Primary Tillage		
3. Name of crop & variety		
4. Area in ha.		
5. Sowing time		
6. Sowing type		
7. Distance in cm		
(a) Between rows		
(b) Between plant		
8. Seed Treatment		
9. Pre sowing irrigation/Dry		
10. Seed kg./ha		
11. Observation.		
(a) Effect on germination		
(b) Plant Population (1 x 1 M)		
(c) Reason of less plant population		

Information of Irrigation

1. Source of Irrigation
2. Application for Irrigation
 - (a) Area ha.

Particulars by	Recommended	Adapted Farmers
1. Method of Irrigation		
(a) Slope of Land		
(b) Length		
(c) Breadth		
2. Reasons for non adaptability of recommendations		
3. Crop stages of Irrigation		
4. Total No. of Irrigation		
5. Total water Cms.		
6. Reasons for non adoption of 3,4,5		

Compost and fertilizer

Particulars by	Recommended	Adapted Farmers
1. FYM/Compost		
2. Fertilizer		
(a) Fertilizer as per soil test/ha/		
(b) Name of Fertilizer		
(c) Fertilizer as per area		
3. Time of application		
4. (a) First Dose		
(b) Second dose		
(c) Third dose		
5. Type of application		

Information about Trial/Experiment/Demonstration

1. Name of trial
2. Object of the trial
3. Crop and variety
4. Area ha
5. Sowing type
6. Sowing date
7. Distance
 - (a) Between rows
 - (b) Between Plants
8. Seed Treatment
9. Seed rate/ha
10. Germination
11. Plant population/ha
 - (a) 21st day after sowing
 - (b) at the time of harvesting
12. Fertilizer/ha
 - (a) First dose
 - (b) Second dose
13. Name of the fertilizer
14. Type of application
15. Type of soil
16. Slope of land
 - (a) Main :
 - (b) Sub :
17. Type of water

18.	Method of irrigation		
	(a) Length		
	(b) Breadth		
19.	Dates of irrigation		
20.	Total No of Irrigation		
21.	Total water cos.		
22.	Inter-culturing		
23.	Pest and Diseases		
24.	Spraying & distins		
25.	Time of application	Main	By Produce
26.	Date of harvesting		
27.	Total yield q.		
28.	Yield/q/ha		
29.	Market rate/q		
30.	Gross income		
31.	Total expenditure		
32.	Observation & recommendation		

Inter-culturing

Particulars	Recommended	Adapted by the Farmers
(1) Time and type of culturing		
(2) (a) Weeding		
(b) Hoeing		
(3) Reasons for non-adoption		

Pest and diseases

Particulars	Recommended	Adapted by the Farmers
(1) Incidence of pest and disease		
(2) Time of application of insecticides		
Pesticide		
(3) Spraying/dusting and concentrations		
(4) Reasons for non-adoption 2 & 3		

Yield

(1) Time of harvesting:	
(2) Plan count in 1 x 1m.	
(3) Plant population/ha.	

- | | | | |
|------|---------------------------------|------|------------|
| (4) | Yield in Kg. in 10 x 10m | | |
| (5) | Yield in q from sown area | Main | By produce |
| (6) | Yield/ha according to sown area | | |
| (7) | Market rate/q | | |
| (8) | Gross income Rs./ha | | |
| (9) | Total expenditure Rs./ha | | |
| (10) | Profit/loss | | |
| (11) | Reasons for loss | | |

Crop Planning

Name of the cultivator:-

Village :

Total Area ha.

Water area ha.

Well irrigated area ha.

Survey No.:

Sl. No.	Area under Kharif ha.						Area under rabi ha.						Area under Summer ha.					
	Name of Crop	Variety	Canal	Well	Dry	Total	Name of Crop	Variety	Canal	Well	Dry	Total	Name of Crop	Variety	Canal	Well	Dry	Total

Recommendation as per Spending Ability

Name of the Cultivator :

Village :

Survey No. :

Total Area ha.

Season :

Information of cultivator

(1) Bullock pair–Yes/No

(2) Implement–Yes/NO

(3) Labour–Own/hired

(4) Seed-own/purchased

(5) Spending ability as per crop

Name of Crop Area

Rs.

(6) Well –Yes/No

(1)

(2)

(3)

Total :

Recommendation as per crop :

(1) Crop :

(2) Primary Tillage :

(3) Fertilizers :

(4) Seed :

(5) Sowing :

(6) Inter-culturing :

(7) Plant Protection :

(8) Irrigation charges :

(9) Harvesting :

Total Rs.

Irrigation Layout

Sl. No.	Name of farmers	Survey No.	Soil type (%)	Slope of the land	Crop variety	Area in ha. layout and	Method of Irrigation Dimension	No. of Irrigation Water	Qty. of Irrigation applied
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

Yield/ha Main (Q)	By produce	Value Rs./ha Main	By produce	Total	Total cost Rs./ha.	Net profit Rs.	Benefit cost ratio	Remarks
(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)

Package of Practical

(Per Hectare)

Sl.No.	Name of the cultivator	Survey No.	Area under the crop	Soil type	Crop		Variety		Seed rate		Spacing	
					Sugg.	Actual	Sugg.	Actual	Sugg.	Actual	Sugg.	Actual
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)

Sowing Date		Fertilizers NPK			Plant prot		Irrg. Layout		No. of Irrg.	
Sugg.	Actual	As per soil test	As per financial ability	Actual	Sugg.	Actual	Sugg.	Actual	Sugg.	Actual
(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)

Inter-culturing		Total Expenditure Rs./ha.	Yield/ha. Main/by Produce	Value Rs.			Net profit Rs.	Benefit Cost ratio	Remarks
Sugg.	Actual			Main Produce	By Produce	Total			
(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)	(33)	(34)

Cropping Pattern

Chak No.

Year

Sl.No	Name of the cultivator	Sl.No	Crop proposed & variety	Crop sown & variety	Yield q/ha.	Variation in yield (expected yield)	Gross return Rs.	Cost of Prodn. Rs.	Net Profit/loss Rs.	Benefit Cost ratio
		K								
		R								
		S								

K – Kharif

S – Summer

R – Rabi

GUIDELINES FOR THE PREPARATION OF REPORTS FOR CORRECTION OF SYSTEM DEFICIENCIES UNDER RESTRUCTURED COMMAND AREA DEVELOPMENT AND WATER MANAGEMENT PROGRAMME

A number of irrigation projects in the country have been operating much below their potential due to shortage of funds for O&M related activities such as cleaning of the channels by de-silting and weeding, raising earthwork in embankments or dressing the side-slopes to the design standard and removing undercuts in hard strata, strengthening of banks in filling sections, restoring bed gradients, replacing and painting metal parts in gates and hoists, providing APMs/Flumes making control devices, measuring devices and outlets fully functional etc. Lack of timely O&M has resulted in complete deterioration & dilapidation of canals and its structures. This has been by and large responsible for unreliability in availability of irrigation water at farm level and consequently the reduced irrigation efficiency. The scope of the Command Area Development Programme has therefore, been expanded to take care of system deficiencies occurring above the outlet up to distributaries of 4.25 cumec (150 cusec) capacity. This would eventually improve the output of Command Area Development (CAD) activities below the outlet as well.

With a view to ensure sustainability of the correction of system deficiencies undertaken, the State Governments will be required to ensure that distributary Committee on distributaries of upto 4.25 Cumec (150 cusec) are formed, which can take over these distributaries for operation and maintenance, after these have been rehabilitated. The financing pattern for this component is 50:50 between the Centre and States. Broad guidelines for implementation of the component on correction of system deficiencies shall be as follows:

1. The new component of "Correction of System Deficiencies" in minors and distributaries of capacity upto 4.25 Cumec (150 Cusec) has been included under the Restructured Command Area Development and Water Management Programme, which is effective from 1st April 2004.
2. The main objective of this component is to rehabilitate the conveyance system upstream of outlet upto Distributaries of capacity 4.25 Cumec (150 Cusec) with the sole objective of enhancing efficiency and simultaneous handing over of the system to the respective distributary/minor committees for its operation and maintenance in future. It is anticipated that the system, after correction of its deficiencies, shall be able to reduce the gap in irrigation potential created and utilised and shall result into better management practices, efficient water use and increased production and productivity.
3. The component on correction of system deficiencies is to be carried out only on

those distributaries (and all minors under the distributary), where, legalized Water User Associations (WUAs) and their federations at Minor/distributary level are formed, and are active. The associations are to be formed under the legal framework of recognised State Government Act or amended Irrigation Act whichever is in force.

4. Work can be carried out only in those distributaries (and also minors) under which all outlets are saturated, that is all OFD works are completed, Warabandi is in force and equitable distribution of water is taking place.
5. The process of implementation of this item should be simple, economic, feasible and sustainable and distributary/minor wise project proposals may be prepared accordingly. The project proposals may be first discussed in the State level monitoring committee, and the proposal got approved in principle. Thereafter, one copy each of the proposal be sent to the Commissioner (CADWM), MoWR, GoI and Chief Engineer of the concerned regional Central Water Commission Office respectively.
6. The proposal, as far as possible shall be prepared in consultation with the Distributary Committee and the concerned Irrigation department. As far as possible, works may be carried out through or in consultation with the WUAs. Cost estimates shall be as per actual field requirements. The central assistance shall, however, be regulated in accordance with the financing pattern and the cost norms in force.
7. Works shall be carried out during canal closing period.
8. The project proposal be prepared separately for each distributary/minor and shall include:
 - (i) An index map of the project area, a map of the catchment area showing river system, command area and all sources of inflows into and diversions from the system.
 - (ii) A detailed map of the distributaries showing all minors, outlets with capacity and cross sections of each distributary, minor and outlet. Distributary/Minor under reference may be specifically highlighted on the map.
 - (iii) A note on present status of PIM in the State and position of WUAs under the distributary/Minor under reference.
 - (iv) A note on why correction of system deficiency is required. This should include information on water availability and utilisation in the system. Detailed information of demand and availability as approved at the design stage along with approved cropping pattern, periodic demands and copy of working tables be reproduced. In case, there has been any reduction in the available supplies or change in cropping pattern or intensities or scope of the project, a complete review of the hydrology may be appended justifying the design flow in the distributary/minor.
 - (v) Information on present cropping pattern and likely cropping pattern after correction of deficiencies in the concerned distributary/ minor; crop water requirements as worked out scientifically based on soil-water-climate-crop relationships; scheduling of requirements and rotation of the canals etc.

- computation based on delta/duly concept should be avoided.
- (vi) Copy of the MoU for handing over by Irrigation Department (ID) / CADA and taking over by distributary/minor Committees under reference. In case no such handing over/taking over has been done, a written understanding between the ID/CADA and such Committees over willingness to take over the entire system will have to be included. Such written understanding for handing over of distributary/ minor by ID and taking over by the distributary committee/WUA will also be required.
 - (vii) A map of the distributary/ Minor showing location of breaches/ damaged areas requiring correction, structures requiring repairs and areas where removal of silt/ weed growth is necessary.
 - (viii) A detailed note on all items, which need to be corrected.
 - (ix) A note on all water measuring devices those are existing on the distributary/minor at respective heads, mechanism of volumetric distribution of water, water sharing by the members of the WUA.
 - (x) As far as possible, audited accounts of inflows and average annual silt contents should be maintained.
 - (xi) Details of the programmes for training of farmers and field functionaries, involvement of WALMIs.
 - (xii) Lining of the canals in whole or part can be considered provided the cost is within prescribed norms i.e. Rs.4000/- per ha to be shared by Centre and States on matching basis. In no case central funding shall exceed the norms and any cost over and above the prescribed norms shall be met from State funds.
 - (xiii) Cost estimates as per prevailing schedule of rates in the State.
- (9) On receipt of the project proposal by the Ministry and CWC, initially the CWC will examine the same and send it to CADWM wing of Ministry of Water Resources along with its recommendations/observations preferably within a period of one month. The CADWM Wing of MoWR will put up the proposal along with recommendations/observations of the CWC before the Core-Group. The Core-Group would examine the proposal and their approval will be conveyed to the State Govt. and other concerned offices. In case the project is not approved, the same will also be conveyed to the State Govt. along with the shortcomings in the proposal or reasons thereof for not approving it and for resubmission. In such case the proposal shall be deemed to be sent back and not pending in MoWR and will be considered afresh on resubmission.

GUIDELINES FOR RENOVATION AND REHABILITATION OF MI TANKS IN COMMANDS OF PROJECTS COVERED UNDER CADWM PROGRAMME

1. Introduction

A large number of existing minor irrigation tanks within the irrigation commands of the projects covered under the CADWM Programme have fallen into disuse. Many of them have accumulated silt and many require urgent repairs. Such minor irrigation schemes generally suffer from problem of loss of storage due to silting of tanks, poor maintenance and management, encroachment etc. Damage to various structures, inadequate surplus arrangements, silting are some of the reasons for deteriorating conditions in the irrigation system. It is necessary to restore these systems to increase the storage capacity of these water bodies, integrate and augment command supplies and recover the lost irrigation potential. It has, therefore, been decided to rehabilitate and remodel all such existing tanks and integrate them in the irrigation commands of the projects. The rehabilitation and remodeling of these tanks has to be taken up at the last stage after all other CAD activities in the command have been completed. State Government has to bear 50% cost of this component. Formation of WUAs for such tanks and 10% contribution (of the total cost) by them is a pre-requisite. The minimum 10% contribution (of the total cost) by WUAs/farmers is mandatory for sustainable running/future desilting of these tanks for which an effective mechanism is to be devised before implementing the component. The 10% minimum contribution (of the total cost) has to be deposited into the accounts of WUAs as maintenance corpus fund and the interest from the same will be utilized for maintenance. Non-integrable tanks with command of less than 40 ha and new tanks are beyond the purview of CADWM programme.

The following guidelines are to be followed for the purpose of preparing individual project proposals for the above work. The proposals will first be put up for consideration of the State level Committee. After consent of the State level Committee is obtained, one copy each of the proposal may be sent to the Regional Chief Engineer of the CWC and to the Ministry for formal approval. Upon the recommendations of the CWC on technical and financial aspects of the proposals, Inter-Ministerial Core-Group shall consider the proposals for approval of the Ministry. Thereafter, the proposal can be taken up for implementation.

2. Objective

The general objective of the guidelines is to provide uniform criteria for preparation of viable schemes with sound techno economic considerations for preparation of the individual project proposal so that value addition for the proposed investment is achieved.

3. **Preparation of Project Reports/Scheme Proposals**

The Project report / scheme proposal should address the following aspects:

- a. Selection of project: Project should be selected from consideration of priority, need of repair and restoration for providing benefits. The main thrust of the project should be for augmenting storage capacity of the tanks/water bodies for recovering the lost irrigation potential. The schemes shall be selected such that the irrigation potential of tank/water body under consideration has a command area more than 40 ha. Tanks below 40 ha, new tanks and the ones which are outside CADWM commands are beyond the purview of CADWM Programme.
- b. The Project proposals should include details in regard to the background, present status of the tank with reasons for its deteriorating conditions, alternatives, if any, which have substituted/modified original objectives, social/economic considerations and future plan. Considerations made for backward/weaker sections while preparing the project proposal should be brought out.
- c. A note on how the MI tank integrates/augments the supplies of the Command Area may be appended. Map of the Command along with location of the scheme be attached. Map should also show all such schemes within the command that need renovation/rehabilitation.
- b. Type of scheme: The type of scheme should be clearly brought out. Relevant information e.g. general topographical details, description of components of the project i.e. Renovation of Minor irrigation Tanks, check dam, weir, surface flow, lift Construction, renovation of field channels etc shall be brought out. Other considerations e.g. recharge of ground water, water utilization for other purpose to be brought out appropriately Measures for water utilization efficiency e.g. lining of canals etc. should be considered and adopted in the project proposal.
- c. Salient features: Salient features of the project proposal e.g. specific project component details, cost, time of completion of scheme etc. should be provided. The project is required to be completed within a period of two years.

4. **Project planning and design**

The following points should be considered to determine feasibility of the proposal:

- i. Data availability & hydrological studies: General water availability giving hydrological conditions of the area, physiography covering climate, the source of availability of

water, quantum of water available i.e. perennial/non perennial rain fall data including hydrological studies for water availability should be considered. Sources of irrigation available in the command area vis-à-vis the requirement should be analyzed.

- ii. Catchment description: A brief description of the catchments i.e. plain, undulating, hilly including forests etc. shall be given with the following information.
 - a. Catchment Area map of the Project showing all upstream works affecting the flow into the reservoirs.
 - b. Full command Area maps showing all details of canals, branches, distributaries, Minors and outlets.
- iii. Planning and design of scheme and its viability: Design criteria shall be elaborated and viability justified highlighting the basic requirements and importance related to the scheme. Issues on convergence of the project with related activities under other schemes should be brought out clearly. The targeted benefit from the implementation of the proposal spelling out quantitative assessment, incremental area brought under irrigation and other aspects will have to be clearly brought out.

5. **Command Area** The total command likely to be irrigated from the MI tank viz-a-viz the original and lost storage, intensity of irrigation etc. should be brought out. This chapter should contain details relating to status of the existing conveyance system giving inter-alia details of existing deficiencies, which are hindering water use, status of maintenance, availability of funds for O&M, participation of Water Users' Associations etc. in the O&M activities, details of potential created and utilized and that targeted under the project.

- a. Social/ecological consideration: Socio-economic status covering data on population, the type of population affected by the project and the likely social, environmental and ecological impact of the catchment on the command may be considered and commented upon.
- b. Cost aspect: The estimated cost of the project may be worked out by taking up a pilot project and phasing of cost i.e. cost to be incurred during the current year and subsequent years should be projected. All items proposed for execution should be classified leading to total assessment of the works. Their phasing and plan for taking up these activities should be spelt out. The phasing should cover both physical and financial aspects.

The detailed estimate of the project needs to be given along with benefits accruing from the project and BC Ratio etc. as per standard norms. The economic rate of return will also be analyzed and projected.

For preparation of estimates, a limit of Rs 15,000/- per ha of the design potential of the scheme may be adhered to. Cost of development of the OFD works will be as per other CADWM items. Individual components of a project have to adhere to CAD cost

norms of MoWR.

6. **Funding Pattern**

Financing of the project includes the funds from State, Centre and the beneficiaries contribution as per CADWM financing pattern and cost norms. The details of fund flow procedure to be adopted should be indicated.

The funding pattern of the scheme will be in the ratio of 50:50 (center: state). Central share would be released in two installments of 50% each. A budget provision for the matching amount of the State share is to be kept in the State plan for the year. Mandatory 10% contribution (of the total cost) from beneficiaries shall be realized and deposited in fixed deposit accounts of WUAs before the renovation work is started.

7. **Clearance from State TAC**

Projects needs to be cleared from the State Technical Advisory Committee. The environmental clearance and forest clearance, if required from the State Government Departments has also to be obtained as per procedure in vogue. The project proposal should adhere to the guidelines of the Planning Commission also.

8. **Implementing Agency and Implementation Arrangement**

The Implementing Agency i.e. State/District Irrigation Department/Minor Irrigation Department/NGO/WUAs shall be identified including the contribution of beneficiaries by way of labour/financial contribution. The organizational set up at both State level and Project level is to be given. Community participation, capacity building and other related aspects of implementation should be brought out. Implementation of the scheme is to be carried out in consultation with the WUAs and guidelines of this Ministry should be followed in this regard.

9. **Monitoring and Evaluation**

Monitoring of the scheme is to be done by the States with appropriate set up in the State in the concerned user Department. State level Committee shall be apprised about all aspects of planning, design, execution, monitoring and evaluation at all stages. The progress will also be monitored by the Field Units of CWC with provision for periodic monitoring from MOWR for assessment of the direction of the programme, assessing the performance, identifying constraints etc. The Central monitoring will be continued by adopting the existing system of field visits, and submission of Quarterly Progress Reports, Annual Administrative Reports, annual physical and financial progress reports etc.

As far as possible audited accounts of in flows and average annual silt contents should be maintained.

10. **Post Project Sustainability and Maintenance**

Measures proposed to be taken for ensuring post project sustainability need to be clearly brought out in the project proposal. This chapter would also highlight the existing set up dealing with operation and maintenance and delivery arrangements up to farmers holding and other OFD works. Legal status of provisions of regulatory Acts, administrative measures, methodology of achieving farmers' participation and collection of water charges etc. are to be detailed along with proposal for rationalization of water charges. On completion of the project the plan for handing over the project to WUAs for operation and maintenance needs to be brought out including the availability of funds for the purpose.

11. **Submission of Project Proposal**

The project proposal will be first discussed in the State level monitoring committee and then will be forwarded to the regional offices of CWC. The CWC will examine the project proposal in consultation with State Government Authority before consideration of Ministry of Water Resources for approval.

12. **The Report should have the following chapters**

Name of the Scheme: Repair & Renovation of Water Bodies/MI tanks

1.0 Type of project

1.1 Components of the project

- a) Renovation of minor irrigation tanks
- b) Lining of canals
- c) Other considerations
(e.g. recharge of ground water, water utilization, other components)

2.0 Benefits

3.0 Features

- 3.1 Augmenting storage capacity
- 3.2 Extending irrigation facility
- 3.3 Completion of scheme

4.0 Priority/ need of repair

4.1 Main thrust

- 5.0 Command area
- 6.0 Reasons for deteriorating conditions
- 7.0 Original project objectives
 - 7.1 Utilization efficiency
 - 7.2 Original and lost storage
 - 7.3 Intensity of irrigation
 - 7.4 Potential created
 - 7.5 Potential utilized
 - 7.6 Potential targeted
 - 7.7 Incremental area brought under irrigation
 - 7A Implementing Agency
- 8.0 Feasibility
 - 8.1 Water availability
 - 8.2 Source of irrigation available
(Vis-à-vis. The requirement)
 - 8.3 Upstream works
 - 8.4 Down Stream Works
 - 8.5 Convergence with other schemes
 - 8.6 Socio economic aspects
- 9.0 Basic requirements
 - 9.1 Viability justified/ Importance
 - 9.2 Existing deficiencies
 - 9.3 Status of maintenance
- 10.0 Total Cost
 - 10.1 Availability of funds
 - 10.2 Funding Pattern
 - 10.3 Fund flow procedure
- 11.0 B.C. Ratio
- 12.0 State TAC clearance
 - 12.1 Environmental clearance
 - 12.2 Forest clearance

13.0 Implementation arrangement

13.1 Role of beneficiaries

14.0 Monitoring Arrangement

14.1 State level committee

15.0 Consideration for ensuring post project sustainability

16.0 Future plan