

Report of the Committee
on
**Pricing of Irrigation
Water**

Planning Commission
Government of India
New Delhi

September, 1992

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EXECUTIVE SUMMARY

1. Introduction

(1) There has been widespread concern about the large and growing magnitude of losses on irrigation projects. A need has been felt to examine in depth the existing mechanism of water pricing, its level and structure, modalities of improving the recovery of dues, the norms of maintenance and other related issues. It was against this background that the Planning Commission constituted the Committee on Pricing of Irrigation Water in October 1991.

(Paras 1.1 to 1.8)

(2) Within the limited time available, we have had to rely heavily on work done and information compiled by earlier studies, supplemented by such information as could be obtained from State Governments through correspondence and discussions, field visits and meetings with experts.

(Paras 1.9 to 1.14)

(3) In several instances, the specificities of local situations will have to be taken into account while implementing the broad approach and specific principles embodied in our recommendations.

(Para 1.15)

(4) Much of the information which is crucial for a proper assessment of the performance of irrigation systems is hardly even compiled regularly, much less analysed. We hope that action will be taken to build up a system to generate reliable data on a continuing basis.

(Para 1.16)

2. Financial Performance of Public Irrigation Systems

(1) A number of Commissions and Committees are agreed that the income from irrigation works should cover the annual maintenance and operation costs, but there are some differences as to whether, and if so to what extent, capital related charges should be covered. The National Water Policy 1987 asserted that water rates should cover the annual maintenance and operation charges and a part of the fixed costs. It is against this background that we must review the existing system of water pricing.

(Paras 2.1 to 2.14)

(2) The incidence of irrigation charges varies a great deal across states, and the rate per unit volume of water consumed varies greatly across crops. The wide variability in the level and structure of rates per ha. cm suggests that there is scope for a rationalisation of the rate

structure. In no State does the gross receipt by way of water charges per hectare account for more than 3 per cent of the gross productivity per ha of irrigated area.

(Paras : 2.15 to 2.26)

(3) Revision of water rates has been infrequent, hesitant and very much less than the increase in costs. The all-round deterioration in the financial performance of irrigation projects is stark and nearly universal. The gross receipts of major and medium irrigation and multipurpose projects fell short of their working expenses by about Rs. 168 million a year on an average during the three years 1974-77; the gap rose to Rs. 2775 million a year during the period 1984-87. Including interest on capital outlay, the deficit rose over the same period from about Rs. 1737 million a year to Rs. 9867 million a year.

(Paras 2.27 to 2.31)

(4) There are some questions concerning the coverage and conceptual basis of the accounts figures. These are set forth in the text of this Report.

(Paras 2.32 to 2.35)

(5) For working out the full cost of providing irrigation water, the capital outlay for the purpose of calculating re. interest (as also depreciation) has to be the entire capital outlay on the irrigation sector, covering not only all major and medium projects without regard to the commercial/non-commercial classification, but also minor irrigation and the capital outlay, if any, under CAD as well.

(Para 2.36)

(6) For working out the element of interest on capital, it is in our view appropriate to take the average interest rate paid on the outstanding public debt of each State. There is also a strong case for the capitalisation of interest during construction in departmental management accounts.

(Paras 2.37 & 2.38).

(7) For determining the capital base which should bear the interest, projects which are still under construction have to be excluded; at the same time, projects in many cases begin supplying water long before they are completed. Actual costs tend to be inflated by a variety of factors (such as time and cost over-runs; defects in project design; deficiencies in management; waste; leakages etc.). In the absence of accurate information regarding such matters we decided to take the cumulative outlays three years prior to the accounting period as the base for computing depreciation and interest. Depreciation is taken at 1% of capital investment.

(Paras 2.39 & 2.40)

(8) On the basis of our estimates, the total unrecovered costs on account of major and medium irrigation works (14 major States) increased more than fivefold in a 10-year period from Rs. 280 crores in 1977-78 to Rs. 1525 crores in 1986-87. We would strongly urge that a serious and detailed scrutiny of the accounting of the costs and revenues of minor irrigation works also be undertaken to determine the order of subsidies involved.

(Paras 2.41 to 2.44)

(9) It is not possible to determine how much of the implicit subsidy is attributable to inefficiency and how much really benefits farmers because of the under-pricing of water. Attempts to reduce the magnitude of overall subsidies must therefore focus both on improving the efficiency of planning and management of irrigation (thereby cutting costs) and on increasing the collection of user charges by raising rate and the more effective enforcement of the scheduled rates.

(Para 2.45)

(10) It is necessary to supplement the financial accounts by proper management accounts. We have indicated in detail in the Report the Kind of information which such management accounts should cover. We recommend that the Government, with the assistance of the Central Water Commission, and in consultation with the Comptroller and Auditor-General of India, should examine the matter in the light of those observations and develop a suitable set of revised instructions and forms which will fully serve the purposes in view. We also recommend that the engineer in charge of each system (i.e., each major and medium project and clusters of minor irrigation projects) should be made responsible for the maintenance of these management accounts, and that the Irrigation Department should consolidate these for the State as a whole and produce an annual review presenting the total picture for the State.

(Paras 2.47 to 2.49)

3. Pricing of Irrigation - Approach and Principles.

(1) It is difficult to accept the case for subsidising such a user-oriented and capital-intensive infrastructure as irrigation . The government is not in a position to sustain subsidies on irrigation, or for that matter on any infrastructure, on the present scale.

(Paras 3.1 to 3.4)

(2) Water rates are a form of users charge and not a tax. The basis of determining the cost of the irrigation service and the desirable extent of recovery may be debatable, but not the principle that users of public irrigation must meet the cost of the service.

(Paras 3.5 to 3.7)

(3) Irrigation is one of the key inputs for crop production in as much as the productivity impact of better seeds, fertilisers and other inputs is critically dependent on the way water is used. It is therefore both legitimate and necessary to address the pricing of this input as one of the first steps and an integral component in the process of rationalising the totality of the price structure, and raising the efficiency of water use.

(Para 3.8)

(4) The underpricing of water adversely affects the availability of resources for the management of irrigation systems. Inadequate allocations for maintenance and repairs is a direct consequence of the poor financial position of the states, and is responsible for the low, possibly deteriorating, quality of service. This means that the potential increases in productivity which new technology makes possible cannot be realised in full.

(Paras 3.9 & 3.10)

(5) A revision in the level and structure of water rates is thus necessary in the interest of both efficiency and equity. The revision should be such as to achieve full cost recovery in due course and in the process promote saving, create disincentives for waste and thereby enable the service area to be expanded and a more reliable service assured.

(Paras 3.11 & 3.12)

(6) Revision of water rates should go hand in hand with measures to improve the quality of service and to keep a check on costs.

(Paras 3.13 & 3.16)

(7) In the light of a detailed assessment, rates for non- agricultural uses (domestic, industrial) should be revised so that the costs are fully recovered and arrangements built into the supply contracts for ensuring full and prompt recovery of dues.

(Paras 3.17 & 3.18)

(8) Estimates of full productivity impact in terms of gross or net output for different categories of irrigation in different regions are not available. We strongly recommend that the design for regular crop-cutting surveys should make irrigated land (as a whole and preferably by major types) a separate stratum for the purpose of yield estimation.

(Paras 3.19 & 3.20)

(9) Translating the overall productivity impact of irrigation into rates for particular crops raises difficult problems. There is also the question of how the cost- recovery principle and the 'capacity to pay' will be balanced. In view of these difficulties, and the

severe resources constraints facing the government, we are of the view that cost-recovery should be the main consideration governing rate-determination.

(Paras 3.19 & 3.23)

(10) We recommend that rates should be based on O&N norms and capital charges (interest and depreciation). The government must ensure that the actual O&M outlays more or less correspond to norms, which should be revised once in every five years

(Paras 3.24 to 3.25)

(11) We recommend that State irrigation agencies undertake analyses to arrive at a well-grounded estimate of the capital investment attributable to the irrigation service.

(Paras 3.27 to 3.29)

(12) We are of the view that some sort of averaging of rates by region and/or category of projects, as is already being done by several states, is desirable. We suggest the following categorisation: (1) major and medium storage systems; (2) major and medium projects based exclusively on barrages/diversion works; (3) minor surface irrigation works; (4) lifts irrigation from canals; and (5) lift irrigation from groundwater. Where a State has marked variations in agro-climatic conditions, the above categorisation may be done by agro-climatic regions.

(Paras 3.30 to 3.33)

(13) Attempts at distinctions in terms of head and tail reaches of a system, quality of soil, or other criteria for rate-determination should be approached with considerable caution, as they are difficult to apply and will add to the complexity of water pricing.

(Paras 3.34 to 3.36)

(14) There are divergent views on whether or not there should be any levy on conjunctive use. On the whole, we are of the view that recycling seepage from surface sources should not be taxed.

(Paras 3.43 & 3.44)

(15) There is a strong case for applying a two-part tariff. All lands included in the command should pay a flat annual fee on a per hectare basis for 'membership' of the system which entitles them to claim water and gives them the benefit of several other facilities which are associated with the spread of canal irrigation; and a variable fee linked to the actual extent of the service (volume or area) used by each member. Such a two-part tariff would be applicable in the case of major/medium irrigation schemes. In the case of minor projects, wherever the O&M of the system is completely turned over to water users'

associations, the associations would be charged only the basic flat rate on a per ha basis. However, till this is achieved, water charges for any minor scheme would be levied on par with major/medium schemes.

(Paras 3.48 & 3.49)

(16) Many considerations - linking water rates to quality of irrigation service, rationalising rate structure and reducing cost of assessment and collections argue strongly for a system which makes water charges explicitly a function of the volume and season. Volumetric assessment at the level of individual farmers would be both expensive and impracticable. However, it is feasible at reasonable cost to monitor volumes delivered at the distributary outlets at different points of time.

(Paras 3.37 to 3.47)

(17) The move to full-fledged volumetric pricing cannot be introduced immediately. The proposed rationalisation of water pricing will have to be accomplished in a phased manner.

(Paras 3.50 & 3.53)

(18) The objective of the first phase should be to rationalise and simplify the existing system of assessment (based on crop-wise irrigated area on an individual basis) to a system of season-specific area rates. It is possible to estimate the relative water consumption per hectare irrigated in different seasons. The variable part of the tariff in the case of major and medium projects and such of those minor works as are still under state management should be fixed on this basis. We would urge that all minor systems be turned over to users immediately after completion. Both categories of projects will pay a flat basic rate per ha. The level of cost-recovery to be aimed at in the first phase should at least cover the O&M costs and 1% interest on capital employed.

(Paras 3.54 to 3.56)

(19) Irrigated area under a crop which spreads over two seasons will be charged at the rates applicable to both seasons, and perennials for all three seasons; but crops like paddy which take a lot of water for non-consumptive uses need specific treatment. Where paddy is a significant but not a dominant crop, some differentiation may have to be made, in each season, therefore, we need to distinguish at best three categories, viz, paddy, sugarcane and perennials and other crops.

(Para 3.57)

(20) In the second phase to be implemented in the course of the next decade, the aim would be to shift to a fully volumetric system. Additional investments to modify the distribution system for effective regulation of volume delivered at outlets (estimated at

approximately Rs.5,000 crores) will be needed. As system efficiency and productivity improve, the targets of cost recovery can be progressively increased.

(para 3.58)

(21) There are many important matters of detail to be decided in shifting to the volumetric system of charging. These are best decided In consultation with users' representatives. The most crucial and also the most difficult task in this phase will be to promote the formation of sufficiently large farmers' groups.

(Para 3.59 to 3.61)

(22) Phase III, which will spread over a much longer period should seek to extend and consolidate the system of farmer group management, and implement, with the involvement and participation of such groups, a programme for upgrading the system to a higher level of efficiency in water-use and therefore of productivity. Besides substantial investments in conjunctive use and distribution networks, the techniques of water management will have to become tighter and more sophisticated.

(Para 3.62)

4. Operation and Maintenance

(1) It is generally recognised that the funds allotted for O&M are inadequate. The amount actually spent on O&M on a conceptually clear and uniform basis cannot be determined from published budgets or accounts. The importance of improving the accounting of expenditures needs hardly any emphasis.

(Paras 4.1 to 4.4)

(2) There is a case for earmarking the whole or a substantial part of the receipts from each irrigation system towards the operation and maintenance of that system. In the long run, there is a case for moving towards the conversion of each irrigation system into an independent self-financing system, whether through the formation of corporations or otherwise.

(Para 4.5)

(3) The Finance Commissions sought to make adequate provisions for O&M based on certain norms, but the general complaint is that the amounts provided for the O&N of irrigation projects continue to be well short of norms.

(Paras 4.6 to 4.7)

(4) There is a strong case for the department divesting itself of the responsibility for the maintenance of the network below a certain level of outlet (say, a 100 ha outlet), and

transferring this responsibility to users'groups. This would not merely reduce costs but would also enable the Department to concentrate on the _ maintenance of the main system and perform that function better.

(Para 4.8)

(5) We recommend that States set up special expert groups to work out appropriate norms and a procedure for periodic monitoring and updating for different agro-climatic regions and broad categories of projects.

(Paras 4.9 & 4.10)

(6) If we wish to switch over to group-based delivery, it will be necessary to clear the backlog of deferred maintenance and to upgrade the main system to bring it to the desired standard. We recommend that (a) atleast 10% of the plan provision for major and medium projects be allocated for renovating and upgrading existing systems; and (b) the recovery of accumulated arrears - the magnitude of which is currently very large - be earmarked towards meeting the cost of deferred maintenance/ special -repairs in the project concerned.

(Paras 4.11 & 4.12)

(7) Even after such restoration, it is essential to maintain all the project components properly. (An account of maintenance needs is given in the text of the Report and the related Annexures).

(Paras 4.13 4.16 and Annexure 4.2)

(8) The Committee is of the view that there should be separate norms for components with different characteristics. The Committee commends the methodology adopted in working out O&M norms for projects in U.P. and for Jayakwadi Project in Maharashtra.

(Paras 4.16 & 4.17 and Annexures 4.3 & 4.4)

(9) Based on our general recommendations, the States should work out the norms; and based on these norms, the per hectare norm for maintenance can be worked out. This should be a region-wise exercise, distinguishing different categories of projects. in exceptional cases, for mega projects, it may even be possible to have project-specific norms. At the State level, the budgetary provision for the Department should be on this overall per hectare basis, whereas allocations will be made to. Individual projects based on the components of maintenance costs.

(Paras 4.18 6 4.19)

(10) The staff component has been increasing over the years leaving progressively less funds for physical maintenance. Deliberate efforts are called for to bring down the staff

costs substantially. As a first step, the strength needs to be frozen and redeployed. One of the effective ways of cutting costs is to transfer some functions to users' groups.

(Paras 4.20 to 4.24)

(11) It will be useful if the Central Water Commission could undertake a systematic comparative study of the existing norms and the actual situation on the ground in all the major States.

(Para 4.25)

(12) The States should form a high-powered autonomous Board which may be called "Irrigation and Water-Pricing Board" to review the policy, establish the norms regarding maintenance costs for various components and staff costs, assess the actual expenditure in relation to these norms, and determine the parameters and criteria for revising water rates. There should be a mandatory review of all these matters every five years with an opportunity for users to present their views

(Para 4.26)

5. Assessment and Collection

(1) Among the various problems faced in the matter of assessment, unauthorised irrigation and the incorrect reporting of crops and irrigated area are the major ones. There are also delays in raising demands. In spite of low and subsidised water rates, actual revenue recoveries are substantially below the demands. Large arrears have been allowed to accumulate and these tend to be eventually written-off. The existing mechanisms for preventing unauthorised, excessive and wasteful use of water as well as for the recovery of outstanding dues have not proved very effective. Lack of coordination among different agencies involved in assessment and collection also aggravates the problem.

(Paras 5.1 & 5.8)

(2) There is considerable diversity in the mechanism for the assessment and collection of irrigation revenues. The limited data that we have seen suggest that the ratio of accumulated arrears to annual demand is generally much higher in States where the Irrigation Department is responsible for both the assessment and collection than in States where both functions are vested in the Revenue Department or where they are divided between the Irrigation and Revenue Departments. Having considered the matter, the Committee is of the view that the assessment function is best entrusted to the Irrigation Department. As for collection, States may choose one of two options - (1) entrusting both assessment and collection to the Irrigation Department, and (2) making the Irrigation Department responsible for assessment and the Revenue Department for collections - in the light of their specific circumstances and experience. Where alternative (1) is preferred, it

would be necessary to empower the Irrigation Department officials to recover arrears of irrigation dues under the Revenue Recovery Laws.

(Paras 5.9 to 5.15)

(3) The Committee would like to emphasise the need for purposive and strong measures to ensure the accurate assessment of irrigation charges and their prompt and full collection. We suggest that a regular system of independent verification of actual irrigation on a sample basis be introduced on all major and medium project commands. At the same time, we strongly recommend that a serious effort be made by Irrigation Departments to use remote sensing as an independent source, of information on irrigated area which can be used along with sample verification to test the veracity of records maintained by field staff. Such independent checks linked to a system of penalties for inaccurate (and rewards for accurate) recording would minimise the loss from under-assessment.

(Paras 5.16 to 5.18)

(4) We are of the view that the practice of waiving or suspending collections of irrigation charges on account of drought is not justified in respect of areas actually irrigated.

(Para 5.19)

(5) The reluctance of the governments to support the agencies concerned in enforcing the regulations has led to a situation in which these agencies have practically given up even raising demands for betterment levies; very little is done to take cognizance of the widespread violations of rules and even less to enforce what little penalties are levied. He need hardly emphasise that such laxity has serious consequences not just in terms of revenue but for the efficient management of the systems.

(Paras 5.20 & 5.21)

(6) With a view to improving collections, the States should consider switching from the existing system of supplying water on credit to one of supply against advance payment. The collection performance relative to demand should be an important consideration for deciding the allocation of O&N funds to individual systems. We also recommend that proceeds from the collection of accumulated arrears from a system be used for making up the cumulative effects of past neglect in the maintenance of that system.

(Para 5.22)

(7) Until a system of group assessment on a volumetric basis is introduced, the State agencies will need to verify and record the area irrigated by plots in order to determine the dues from individual farmers. The proposed system of season-hectare assessment (i.e., assessment on the basis of area irrigated in each season) will substantially simplify the task.

In the case of minor surface works, since assessment will be at a flat rate per hectare of command, there is no need for recording crop- wise area irrigated for the assessment of water rates.

(Paras 5.23 to 5.25)

(8) The aim should be to increase user participation in management initially at the level of distributaries and minors, and in due course at the level of the system as a whole. Each system should become an autonomous entity which manages its own finances both for operation and eventually for the expansion/improvement of facilities.

(Para 5.26)

Role of Farmers' Groups:

(1) The country must move over progressively from management wholly through the government bureaucracy to management by user farmers. As a first step, we suggest a substantial reduction in the sphere of responsibility of the government and the encouragement of user groups to take over maintenance, management of water allocations, and collection of water rates for a group of outlets serving at least a village.

(Paras 6.1 to 6.4)

(2) The general consensus among knowledgeable people is that efforts to actually organise farmers' groups and make them participate in management: have not really made much of an impact. Initiative for group formation will be forthcoming from users only if they see a reasonable prospect of substantial gain and if circumstances create the compulsion for cooperation. Steps for accelerating the process of forming effective users' groups have therefore to be conceived in a wider framework combining better management of the system as a whole with incentives for group operation.

(Paras 6.5 to 6.11)

(3) We have already suggested a three-phase programme for system improvement. The focus initially will be on investments necessary to effectively regulate deliveries at the minor/outlet level, and the formulation of clear operation rules. After this initial phase, which will culminate in volumetric group delivery and pricing, farmers' groups can play a major role in planning and implementing more basic system improvements. In the long run, the aim should be to get these groups actively involved in formulating and implementing system-improvement programmes. The ingredients of all these improvements are location-specific and best planned in cooperation with users' groups. A judicious combination of the profit motive, financial assistance and social pressure for equity and greater dispersal of water rights would be needed for the successful transformation of the system.

(Paras 6.12 to 6.16)

(4) It may be necessary to start with relatively smaller groups and gradually expand them to cover a group of outlets in close proximity. As a practical matter, the users' groups might - to begin with - be organised on a village basis.

(Para 6.17).

(5) The user-groups will be wholly responsible for (i) maintenance of the channels below the point where the water is delivered; (ii) payment of water charges to the system on the basis of an explicit contract; (iii) determining and enforcing the rules of allocation among the farmers served by the outlet as well as the rates to be charged from individual users. The crops to be grown, the construction of subsidiary storages or the conjunctive use of seepage will be left to be regulated exclusively by the group. The group will be free to determine the basis as well as the level of water rates and other additional service charges, if any. The surplus, if any, over the payment of dues to the system will be available for meeting local repairs, maintenance and even improvement of facilities.

(Paras 6.18 & 6.19)

(6) There is bound to be scepticism about the benefits of the proposed changes. Also, villages/ farmers' groups are heterogeneous and have internal conflicts. Great care should be taken to select initially villages/outlets which are favorably placed especially in terms of social homogeneity, relative freedom from conflicts and existence of a strong local leadership.

(Para 6.28)

(7) It is necessary to devise incentives which discriminate strongly in favour of farmers' groups and discourage individual service. The incentive will be strong if the revised rates are substantially lower for those who accept group-based volumetric charging than for farmers who wish to continue on the individual area-based demand system. Additional incentives would be allocation of funds for irrigation system improvement to effective farmers' groups which are willing and able to take over management responsibility, and the entrustment to such groups of contracts for system maintenance works in their vicinity. The government must declare its intention to withdraw, after a designated period of 5-10 years, from the responsibilities for management below the outlet, and confine itself to delivering water for a specified duration at the minor or the outlets. There should be a supportive attitude on the part of the departments concerned at all levels to the formation of groups, the provision of technical advice and assistance, and the encouragement of voluntary organisations to play a larger role in the process.

(Paras 6.21 to 6.23)

(8) The form that a farmers' group takes should be one which makes the group a legal entity which is capable of entering into enforceable agreements. The Government cannot enter into agreements with informal associations. However, we do not propose to make any specific recommendations on the form that the farmers' groups should take. This is a matter for each State Government to consider in the light of local circumstances.

(Paras 6.24 to 6.27)

(9) While the government will necessarily have to play the lead role in main system improvement, user's groups could play a role in the process. Appropriate organisational forms comprising the government, the financial institution* and users will have to be evolved. The case for the active involvement of user groups in improvements below the point at which they take over is much stronger, as detailed local knowledge and consensus is very critical for this activity. Here again the modes of participative planning and implementation should be established in the light of the experience of some well-chosen pilot projects.

(Paras 6.28 to 6.30)

(10) The sheer magnitude of the problem makes it imperative to encourage initiative from wherever it is forthcoming - whether voluntary organisations, such as cooperatives or non-profit groups or public -interest activists. Voluntary organisations usually lack professional manpower for management and technical functions, but this can be overcome by encouraging them to create a cadre of Paratechnologists. The role of voluntary organisations is often crucial in the initial stages of group formation. They have also a broader long-term role in bringing farmers' priorities and needs into the planning of system-modification and improvement. However, eventually all the tasks involved have to be performed by the water users' associations, with the Irrigation Department retaining responsibility for the regulation, monitoring and maintenance of the main system. The experience of some successful voluntary organisations can be studied. The resources of institutions such as IRMA, the IIMs, the Administrative Staff College of India, WALMI and water resource departments of technical universities, need to be availed of in a purposeful manner.

(Para* 6.32 to 6.34)

(11) It seems worthwhile to create a special fund in each State for financing the promotional work and pilot projects for system improvement.

(Paras 6.35 & 6.36)

Implementation

(1) For the purposes of illustrating the application of the suggested approach to the revision of water rates, if we use the norm suggested by the Jakhade Committee, namely, Rs. 180 per ha. gross irrigated area, with adjustments for inflation since 1987 and for departmental overheads at 25 per cent of the norm so adjusted, and add interest @ 1% on capital, the total recovery in Phase I should average around Rs. 340 per ha. As against this, the estimated gross receipts from major and medium projects in 1989-90 was Rs. 68; the actual irrigation revenue works out in 1989-90 to Rs. 50 per ha. Assuming conservatively the additional revenue on account of an increase in the rates for industrial use at Rs. 10 per ha, the recovery from irrigation charges in Phase-I has to be Rs. 310 per ha compared to the present realisation of Rs. 50 per ha.

(Paras 7.1 to 7.6)

(2) Stricter assessment and collection should increase revenue collections by 35-40 per cent of actual receipts (or Rs. 17-20 per ha area) without any change in the level or structure of rates.

(Paras 7.7 & 7.8)

(3) A basic levy at the rate of Rs. 50 per ha is recommended for all lands in the cultivable commands of major and medium as well as minor works. This is intended as a fee for the right to get water from the system (a sort of "demand charge").

(Para 7.9)

(4) The rate per unit of water needs to be equalised across crops. The additional revenue through such rationalisation will be sizeable, the increase ranging from 18 per cent to 140 per cent of the revenues at current rates if the per ha. cm. rates for all crops are made equal to the irrigation rate now charged for ID crops, and from 50 to 325 per cent if they are made equal to the highest irrigation rate per ha. cm.

(Paras 7.10 to 7.12)

(5) The level of rates will also have to be raised. The extent of increase required, depending as it does on the potential for rationalisation, cannot be quantified. It is also likely to vary from State to State. Nevertheless, on the average, the required revenue by way of irrigation charges (Rs. 310 per ha) will still be barely 6% of the gross produce per hectare of the irrigated area, and that without taking any account of likely improvements in productivity.

(Para 7.13)

(6) As a measure of inducement for farmers' groups to take over greater responsibility, we suggest that when the proposed revisions are implemented, the rates for group delivery

be fixed at substantially lower levels than for individual delivery, while keeping the basic fee of Rs. 50 per ha. Common.

(Para 7.14)

(7) In phase-II, the basic flat rate per ha of CCA will continue but should be related to an obligation on the part of the system to provide a minimum level of service defined in terms of volume of water for the staple crop seasonal. The variable rate will be switched progressively to a volumetric rate for group users. As the productivity of water increases, the variable rate can be raised so that the O&M costs and a larger part of the capital-related charges are recovered. Full cost recovery should be the goal for Phase-III.

(Para 7.15)

(8) There are differences among States in the extent of under-recovery of costs. The gap would be smaller in some States if the receipts on accounts of irrigation recovered as part of land revenue could be separated and fully accounted for.

(Paras 7.16 & 7.17)

(9) The revenue potential of better collections is seen to be high in those States where the order of increase in revenue required to meet the cost recovery standards recommended is also large. In such situations, efforts to improve assessment and recoveries must be given high priority. The scope for augmenting revenues through a rationalisation of the existing rate-structure is substantial but variable. A detailed illustrative exercise is given in Annexure 7.2.

(Paras 7.18 to 7.21)

(10) The implementation of the approach suggested here will require expeditious action on the part of each State to set up task forces, with adequate expert staff and authority for collecting the necessary data, to determine O&M norms by region and category of projects; undertake sample studies in the field to determine the extent of under-assessment and under-collection at existing rates; determine the per hectare rates applicable to paddy and other seasonal crops by season and for perennials in terms of volume of irrigation required and costs connected with carry-over between seasons; and work out the existing and projected use by non-agricultural users and determine the rates to be charged to such users, the appropriate contractual arrangements, and other relevant details.

(para 7.22)

(11) Simultaneously, a programme to encourage users' groups should be initiated, and a time-bound programme for switching over to group delivery should be announced. In tandem, programmes for upgrading capabilities of existing systems to manage regulated

delivery to groups and working out the operational rules in terms of which the groups will enter into contracts with the system should be launched.

(Para 7.23)

(12) The Centre and the Planning Commission can help the process by active intercession with the State Chief Ministers to explain the rationale and urgency of the proposed reforms. The Centre can also support the reforms through a programme of public education to explain their rationale; provide financial and technical support for initiatives to demonstrate the feasibility and advantages of group management; and persuade States to earmark sufficient funds for upgrading system-capability for introducing group-based volumetric supply and pricing. The National Water Management Project (NWMP), which needs to be substantially expanded and re-oriented in the light of our recommendations, would seem to be an appropriate instrument for this purpose.

(Paras 7.24 & 7.25)

(13) A minimum financial return should be reintroduced, along with the test of viability in terms of social benefits relative to social costs, as essential criteria for sanctioning all investment proposals whether for new projects or for the improvement of existing proposals.

(Para 7.26)

(14) These changes are essential and important constituents of any effort to improve public finances generally and those of the State Governments in particular, but are also required as part of an effort to improve the productivity of irrigated agriculture by making farmers aware of the value of water and at the same time enabling them to get a larger output per unit of water delivered by public systems.

(Para 7.27)

CHAPTER - 1

INTRODUCTION

The Appointment of the Committee

There has been a massive development, of irrigation in India since the inception of planning. Huge investments have been made in the public sector to develop the irrigation infrastructure to support agricultural growth. Altogether during the four decades from 1950-51 to the present some Rs.40,000 crores have been invested by the public sector on all forms of irrigation, the bulk of it on projects (mostly major and medium surface irrigation works) directly under the auspices of the Government. The total investment on major and medium works between 1950-51 and 1990-91 is placed at over Rs.26,000 crores and this is estimated to have created the potential to irrigate around 33 million hectares, an increase of 23 million ha compared to the level attained at the beginning of the first plan. During the same period minor surface irrigation works (mostly under the state auspices) are estimated to have added 4.5 million ha to the country's irrigation potential, bringing the total to 11 million ha. Some additions to groundwater irrigation have also occurred under the public tube-well programme. While the precise magnitude is not known, it is relatively small compared to the potential created in the private sector. Substantial investments have also been made to speed up the utilisation of the potential (through the Command Area Development Programme) and in the modernisation and improvement of existing systems (Tables 1-1 and 1-2).¹

Table 1
Plan Expenditure on Irrigation in India

(Rs. Crores)

Sl. No.	Period	Major & Medium	Minor			All Sources
			State	Institutional	Total	Total
1	2	3	4	5	6	7
1	First Plan (1951-56)	376.240	66.620	NEG	66.620	442.860
2	Second Plan(1956-61)	380.000	162.230	19.330	161 .580	541 .580
3.	Third Plan (1961-66)	576.000	327.732	115.370	443.102	1019.102
4	Annual Plan(1966-69)	429.810	326. 191	234.740	560.931	990.741
5.	Fourth Plan (1969-74)	1242.300	512.282	661.060	1173.342	2415.642
6	Fifth Plan (1974-71)	2516.180	630.830	778.750	1409.580	3925.760
7	Annual Plan(1978-80)	2078.580	501.500	480.400	981.900	3060.480
6	Sixth Plan (1980-85)	7368.850	1979.260	1437.560	3416.820	10785.650
9	Seventh Plan					
	(1985-90)	11047.640	3215.910	3063.870	6279.780	17327.420
10	Total for all Plans [@]	26015.580	7702.553	6791.100	14493.655	40509.235

Source: Central Water commission (CWC), Water and Related Statistics-(April,1992).

* Figures are likely to undergo changes.

[@] Includes expenditure on Command Area Development(CAD) and National Water Management Project (NWMP) except the central assistance available to States under CAD Programme.

¹ Details at the state level are given at Annexures-1.5 to 1.7.

Table 1.2

Planwise Irrigation Potential Created & Utilisation in India

(Thousand hectares)

Sl. No	Period	Major & Medium Surface Water		Minor Irrigation						Irrigation All Sources	
		P	U	Surface Water		Ground Water		Total		P	U
1	2	3	4	5	6	7	8	9	10	11	12
1	Pre-plan upto 1951	9705	9705	6401	6401	6500	6500	12901	12901	22606	22606
2	First Plan (1951-56)	2486	1280)	53	53	1777	1777	1830	1830	6459	5177
3	Second Plan (1956-61)	2145	2067)								
4	Third Plan (1961-66)	2231	2123)	58	58	4231	4231	4289	4289	8050	8050
5	Annual Plans (1966-69)	1530	1576)								
6	Fourth Plan (1969-74)	2608	1937	450	3450	3930	3930	4380	4380	6988	6317
7	Fifth Plan (1974-78)	4014	2475	538	538	3362	3362	3900	3900	7914	6375
8	Annual Plant (1978-80)	1895	1482	500	500	2200	2200	2700	2700	4595	4182
9	Sixth P lan(1980 - 85)	3401	2685	1697	1010	5823	4238	7520	5248	10921	7933
10	Seventh Plan (1985 -90)	2900	2560	1290	960	7800	6910	9090	7870	11990	10430
11	Pre-Plan * Plan Period	32910	27890	10990	9970	35620	33150	46610	43120	79520	71010

Source: Central Water Commission, Water and related Statics (April,1992)

P* Potent III Created

U Potential Utilisation.

1.2 There is widespread concern about the reported large under- utilisation of potential created; the fact that the productivity of irrigated land is well below the potential with available technology; and the large and growing magnitude of recurring losses on irrigation projects. The revenues from public irrigation works do not cover even the costs of operation and maintenance, not to speak of the recovery of any part of capital costs. There has been a general complaint that the standards of maintenance are poor and progressively getting poorer resulting in a deterioration in the quality of service. Irrigation water rates being levied by the State Governments vary from state to state and from project to project as well as for crops and seasons. These have not been revised in many States for a long time. The existing structure of crop-related water rates is seen to be ineffective in regulating the crop pattern. The recovery of water rates has also been unsatisfactory. As a result, the element of unrecovered cost in the irrigation sector has gone up to an extent which is a cause for

alarm in the context of the serious deterioration in the overall fiscal situation of the central and the state governments. Therefore, a need has been felt to examine in depth the existing mechanism of water pricing, its level and structure, modalities of improving the recovery of dues,, the norms of maintenance and other related issues.

1.3 It is against this background that the Planning Commission (vide their Notification No.16 (134)/90-I4CAO dated 23rd October,1991) constituted the Committee on Pricing of Irrigation Water under the Chairmanship of Dr. A. Vaidyanathan. copies of the Notification containing **the** composition and the terms of reference (TOR) of the Committee, and of the various corrigenda, are at Annexure-1.1.

Composition:

1.4 The nominations of the Members representing the States indicated in the initial composition of the Committee were made by the Governments of the respective States. The Ministry of Agriculture, Government of India also nominated their representative on the committee. Subsequently, the Planning Commission (vide corrigendum dated 5th December, 1991 changed one Member as well as the Member Secretary. Also, the Planning Commission (vide corrigendum dated 20th February 1992) added two new members. The final composition of the committee was as under:

1.	Dr. A. Vaidyanathan, Professor Emeritus, Madras Institute of, Development Studies, Former Member Planning Commission.	Chairman
2.	Shri Ramaswamy R. Iyer, Former Secretary (Water Resources) Government of India, now Visiting Professor, Centre for Policy Research, New Delhi.	Member
3.	Shri V.B. Patel Former Chairman, Central Water Commission, Government of India.	Member
4.	Shri R.L. Pardeep, Additional Secretary, Ministry of Water Resources, Government of India.	Member
5	Shri B.N. Navalawala, Adviser (I&CAD), Planning Commission, Government of India.	Member
6	Sh. M.S. Reddy, Member (WP), Central Water Commission, Government of India.	Member
7.	Dr. Sukhdev Singh, Agriculture Commissioner, Ministry of Agriculture, Government of India.	Member
8.	Shri Dharam Vir,	Member

	Earlier Director-General of Audit, Central Revenues and now Additional Deputy Comptroller and Auditor General, Office of the Comptroller and Auditor General of India, New Delhi.	
9.	Shri P.V. Rao, Principal Secretary, Irrigation and CAD, Govt. of Andhra Pradesh.	Member
10.	Shri S.L. Mukherjee, Secretary, Irrigation Department, Government of Assam.	Member
11.	Shri C.M. Vasudev, Principal Secretary, Irrigation Department, Govt. of Uttar Pradesh.	Member
12.	Shri M.Y.Oke, Secretary, Irrigation Department, Govt. of Maharashtra.	Member
13.	Shri S.S. Ganguli Secretary, Irrigation Department, Govt.of West Bengal.	Member
14.	Dr. V.J. Patel, Jivaraj Patel Agro Forestry Centre, Surendra Bagh (Gujarat).	Member
15.	Shri J.K. Duggal, Secretary, Irrigation Department, Govt. of Haryana.	Member
16.	Shri K.R. Datye, Consulting Engineer, Bombay.	Member
17.	Shri M.L. Lath, Commissioner (WM) , Ministry of Water Resources, Government of India.	Member Secretary

1.5 Shri S.L. Mukherjee, the representative of the Assam State Government could not attend any meeting of the Committee. However, his representative attended one meeting, namely the seventh. Subsequently Shri Mukherjee also discussed the report with Chairman and Member Secretary on 22nd August 1997 at New Delhi. Shri S.S.Ganguli, Secretary, irrigation, Government of West Bengal who was nominated by the State Government retired in March 1992. He as well his successor did not attend any meeting of the Committee. In addition, the following officials also participated in the meetings of the committee on behalf of respective organisations/departments; Shri R.S. Agarwal & Prof. K.P. Jain from Uttar Pradesh, Shri J.N. Nanda from Planning Commission, S/Sh O.K. Chakraborty, N.K. Bhattacharya and B.N. De from West Bengal, Shri D.N. Kulkarni from Maharashtra and S/Shri M.P. Vacher and S.K. Punchi from Haryana.

1.6 The Members of the Committee, including those nominated by the Central and State Governments, the Planning Commission and the Comptroller and Auditor General of India, participated in the deliberations of the Committee in their individual capacities. Their inclusion in the Committee does not imply the concurrence of the organisations to which they belong in the observations and recommendations Contained in this Report, which will obviously need proper examination at both the Central and State levels.

Terms of Reference

1.7 The terms of reference of the Committee were as under:

- (i) To review the existing water rate structure and the extent of subsidy in Government and Public Sector irrigation projects.
- (ii) To suggest:
 - a. the norms for fixing water rates;
 - b. the norms for cost escalation on O&M component of economic water rates;
 - c. the norms for conversion of volumetric supply of water rates of cropwise / areawise water rates for different agro-climatic zones;
 - d. the organisational measures including mechanism for efficient recovery of economic water rates; and
 - e. Operating controls for ensuring levy of appropriate irrigation water rates by the states,
- (iii) To evolve a rational water rate structure for both surface and ground water to promote conjunctive use.
- (iv) To review the present status of maintenance of irrigation projects in different states.
- (v) To review the norms of maintenance as recommended by earlier committees and different Finance Commissions.
- (vi) To suggest the norms for fixing maintenance charges including stipulating the upper ceiling per hectare of command for the expenditure on staff establishment for various irrigation systems in different states.

1.8 The term of the Committee initially was for a period of four months from the date of notification, i.e., from 23rd October 1991 to 22nd February 1992. However, since the appointment of the Member-Secretary took time and the first meeting of the Committee could be held only in late December 1991, the time schedule originally envisaged became unrealistic. The Planning Commission therefore extended the term of the Committee initially upto 30th July 1992 and later upto 15th September 1992 (vide corrigenda dated 20th February and 17th August 1992 respectively).

Scope & Methodology

1.9 The terms of reference of the Committee, involving a wide gamut of the issues relating to water pricing and maintenance of irrigation projects, were comprehensive and complex.

1.10 The limited time available did not permit us to undertake any elaborate and systematic procedure for eliciting views and opinions of various interests involved. We have therefore had to rely heavily on the work done and information compiled by earlier studies. Fortunately, several commissions and committees had examined the problem in the past. The Central Water Commission has collected a considerable amount of data especially in their publications on water rates and on the financial aspects of irrigation works; the former gives a fairly complete and upto-date picture of the level and structure of irrigation rates by crops, type of works and state. The publication on financial aspects gives data on receipts, working expenses and interest charges by state, but only for major and medium projects from 1974-75 to 1986-87. We also had the benefit of (i) a special analysis of unrecovered costs in this sector by the National Institute of Public Finance and Policy based on State budgets, and (ii) estimates of crop water requirements from the Agro-Climatic Regional Planning Unit set up by the Planning Commission. The Water Management Cell in the Ministry of Water Resources did a special analysis of some 84 projects from different states and agro-climatic regions, on area irrigated and water supplied by season, as well as on O&M costs per unit area and per unit volume of water released.

1.11 These data, though very useful, were found incomplete and inadequate for our purposes. In particular, information on area irrigated, crop patterns and volume of water-use by category of projects; demand, collection and arrears of water charges; and the level and structure of costs of operation, assessment and collection; were either not available or outdated. 1.12 We therefore addressed all State Governments seeking information on these aspects both for the State as a whole and for a select number of major and medium projects. Though the material furnished in response was not adequate, we could make up for this to some extent with material available with the central Water Commission and the Ministry of Water Resources, and information gathered during our visits to particular States (namely Andhra Pradesh, Gujarat, Haryana, Maharashtra, Orissa and Uttar Pradesh) but not as fully as we would have liked.

1.13 In each of these States, besides discussions with officers, we also visited one or two irrigation projects and exchanged views on matters related to our TORs with some farmers (See Annexure-1.2). Mid-way in our deliberations, we had an opportunity to hear the views and concerns of the Deputy chairman and his colleagues in the Planning Commission, as well as the Secretary of the Ministry of Water resources. Before finalising our views, we had a very useful discussion with a select group of well known and experienced specialists on irrigation. Finally, the Committee had the benefit of discussions with Shri Vidyacharan Shukla, Union Minister of Water Resources on various issues involved in pricing of irrigation water.

1.14 The Committee held seven meetings (see Annexure - 1.3 for a list of dates and venues of meetings) to discuss the substantive issues concerning the TORs in the light of background material prepared by the secretariat, the views expressed by State officials, farmers and non-official experts, as well as notes prepared by individual members on particular issues. We are encouraged by the remarkable degree of convergence of expert opinion regarding the necessity to view the task of rationalising water-rates as part of a wider reform to improve the quality of water management. Our approach and recommendations are strongly influenced by this perception.

1.15 We are conscious that given the limited time and the gaps in essential data, we have not been able to be as definitive and complete as we would have liked. In several instances, the specificities of local situations - which naturally vary a great deal in a country of India's size - will have to be taken into account while implementing the broad approach and specific principles embodied in our recommendations. This will involve further detailed work in some cases which has necessarily to be done by the agencies concerned in particular States.

1.16 It came to us as a surprise that much of the information which is crucial for a proper assessment of the performance - financial and physical - of irrigation systems constructed at great cost is hardly even compiled regularly, much less analysed. We have thought it appropriate to draw pointed attention to these deficiencies in the hope that the importance of such data for proper management will be better appreciated and action taken to build up a system to generate reliable data on a continuing basis. Scheme of Report.

1.17 The report is structured on the following lines: Chapter 2 broadly deals with the first term of reference. It presents the main characteristics of the existing system of irrigation pricing, and an overall picture of the financial results of public investments in irrigation. It also focusses on the deteriorating financial performance over time reflected in the very rapid growth in the magnitude of unrecovered costs. Chapter 3 reviews the ideas concerning the basis for the determination of water rates as proposed by earlier committees, and proceeds to outline a somewhat broader approach which links water rates to the quality of irrigation service and improvements in the efficiency of management of irrigation systems, both of which are seen to require a progressive shift to a system of volumetric pricing and a greater involvement of users in running irrigation systems. A phased programme covering all these aspects is also indicated. Chapter 4 deals with operation and maintenance. While lack of time and data make it impossible to lay down specific "norms" for O&M, the necessity for differentiating between projects of different types and age and for a uniform methodology to fix and update norms for different categories is outlined. At the same time the chapter emphasises the need for greater efficiency in O&M activities and suggests a number of concrete measures to this end. The problem of improving the assessment and collection of water charges forms the subject matter of Chapter 5. Chapter 6 discusses a strategy for ensuring greater farmer-participation in water management. Recommendations regarding rate revisions and their implications are set out in Chapter 7.

Acknowledgements

1.18 We are grateful to the Deputy Chairman, Planning commission Shri Pranab Mukherjee and his colleagues Member (Agriculture) and Member (Irrigation) for discussing the various aspects of the issues posed to the Committee and to several specialists and experts (see Annexure - 1.4 for a list) for sharing their knowledge and views on the committee's terms of reference. We are also grateful to the Union Minister of Water Resources Shri Vidyacharan Shukla for sparing his valuable time for discussing various issues with the Committee. We extend our sincere thanks to the Ministry of Water Resources and Planning commission for extending all the help and cooperation to the Committee.


1.19 We are grateful to the Secretary Irrigation/Engineer-in- Chief, Chief Engineer and other officers of the states that we visited for giving us their unstinted support in organising tour programmes and extending to us the hospitality and facilities for field visits which provided insights into certain region-specific problems relevant to irrigation-pricing. We would like to thank all the farmers and their representatives for giving their views on different aspects of our enquiry and for discussing frankly and yet with understanding the larger issues involved in rationalising water pricing.

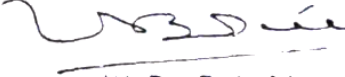
1.20 Our special thanks are due to the Planning Commission and the Central Water Commission for providing to us the requisite material on different aspects of the terms of reference of the Committee. We are also grateful to the National Institute of Public Finance and Policy for providing material on unrecovered costs in the irrigation sector of different states and to the Agro-Climatic Regional Planning Unit of the Planning Commission for providing useful data on crop-water requirements.

1.21 It is our pleasant duty to place on record our deep appreciation of the valuable services rendered by the staff of the Water Management Cell of the Ministry of Water Resources. In particular, the earnest and painstaking efforts of S/Shri N.L. Meena, Sr. Economist and G.C. Bhandari, Sr. Joint Commissioner in the Water Management Cell of that Ministry, in arranging meetings, organising the visits to the states, collecting data, preparing agenda notes and helping in the preparation of the report, are gratefully acknowledged. We are highly indebted to our colleague Shri M.L. Lath as Member- Secretary. Besides being in overall charge of secretariat, he actively participated in the deliberations at all the stages. His knowledge and insights have been very valuable in clarifying and sharpening our thinking on several important issues. We would like to express our special appreciation and thanks to him.



(A. Vaidyanathan)
Chairman

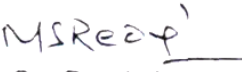
Chairman

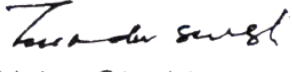

(Ramaswamy R. Iyer)
Member

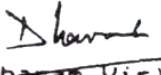

(V.B. Patel)
Member


(R.L. Pardeep)
Member



(B.N. Navalawala)
Member


(M.S. Reddy)
Member


(Sukhdev Singh)
Member


(Dharam Vir)
Member


(P.V. Reddy)
Member


(S.L. Mukherjee)
Member

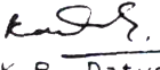

(C.M. Vasudev)
Member

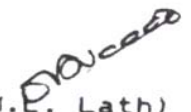

(M.Y. Oke)
Member

(S.S. Ganguli)*
Member


(V.J. Patel)
Member

(J.K. Duggal) **
Member


(K.R. Datt)
Member


(M.E. Lath)
Member-Secretary

* Since retired.

** On leave.

Chapter-2

FINANCIAL PERFORMANCE OF PUBLIC IRRIGATION SYSTEMS

Historical Background

2.1 In the early British days, irrigation works in India were treated as commercial undertakings, and only such schemes were sanctioned as could pay for the annual expenses on maintenance and operation and meet the interest charges on the loan raised. Criteria evolved and finalised by a Select Committee of the British House of Commons in 1872 provided that irrigation projects should be able to yield, after a gestation period of 10 years, a specified rate of return on the capital cost of the project and should also cover arrears of interest on the capital during the gestation period. This rate of return varied over time. Till 1919 it was 4 per cent; between 1919 and 1921 it was 5 per cent and thereafter upto 1949 it was 6 per cent. The pricing of water had to be such as to earn at least the prescribed return on capital after meeting other costs.

2.2 But this approach attracted criticism even during the British period: the recurrence of several famines in the latter half of the 19th century led to a relaxation of this criterion. The state accepted the responsibility for constructing protective irrigation works in areas prone to famines without regard to the financial return criterion. Subsequently, as the scope for the relatively cheap diversion barrages and improvement of old systems was exhausted, new schemes tended to be more costly, and it was felt that the development of irrigation was being held up by the rigid application of the criterion of earning the prescribed minimum rate of return, which ignored the fact that apart from direct irrigation revenues, other benefits accrued to the Government in the shape of increased revenue from excise duties, income tax, sales tax, transport tax etc.

2.3 This view evidently gained support among irrigation engineers. The Central Board of Irrigation passed a resolution at its annual meeting held in 1936 stating that the expansion of irrigation is seriously handicapped by the restricted view taken of the value of irrigation. It urged that an economic survey should be carried out with a view to estimating the direct and indirect financial benefits accruing to the Central and Local Governments from irrigation projects. Even though studies showed that the indirect benefits of irrigation projects were substantial, the financial criterion continued to be applied. But projects which did not fulfil the financial criterion but were considered necessary in the public interest could be sanctioned as 'protective' works.

2.4 The post-Independence period witnessed a marked change in Government's attitude to irrigation investment. Irrigation came to be viewed more and more as part of the necessary infrastructure for agricultural development rather than as a commercial proposition. To begin with, the minimum financial return expected was reduced from 5 per cent to 3.75 percent with effect from 1st April 1949. This facilitated the clearance of projects pending approval and led to a big step-up in public investment in irrigation.

2.5 In 1958, the Planning, Commission initiated studies of some of the major projects to assess the overall benefits and to find a better criterion for deciding whether various irrigation projects should be undertaken. These studies conducted under the guidance of Professor D.R. Gadgil and completed in 1961 showed that large benefits accrued from irrigation in terms of double cropping, diversification and better quality crops, higher yields, larger income and greater opportunities of employment for hired labour. Indirect benefits that accrued were the establishment of processing industries, the expansion of consumer industries, retail trade and transport and communications. The total benefits from irrigation were thus far larger than the direct financial returns accruing to Government from irrigation rates.

2.6 This was followed in 1964 by the appointment of a Committee under Professor Gadgil's chairmanship to review the criteria for approval of irrigation projects. This committee recommended that the economic benefit criterion should be adopted for sanctioning irrigation projects instead of the financial criterion. The Government accepted this recommendation and since then the benefit- cost ratio has been adopted as the basis for the approval of irrigation projects. Irrigation projects with a benefit-cost (BC) ratio greater than 1.5 were considered acceptable from the economic point of view. A benefit-cost ratio of 1.5 instead of 1.0 was suggested as a prudent precaution against likely increases in the cost of projects. With the adoption of the BC ratio as the basis, the requirement that projects should earn a minimum financial return on the capital invested in them was given up.

2.7. The position was reviewed by the second Irrigation Commission, 1972. They were also of the view that the economic benefit criterion was more suitable than the financial return for evaluating irrigation projects: it was simpler and provided a more comprehensive measure of the net benefits to society. The BC-ratio had also come into vogue in many other developing countries. The Commission therefore recommended the continued use of the BC ratio as the basis for decisions concerning investment in irrigation projects. They also endorsed as a prudent precaution that projects with a BC ratio of less than 1.5 should generally not be considered for acceptance, although theoretically a ratio of unity should meet the criterion. However, they recommended that this rule should not be rigidly applied in the case of irrigation projects in the drought-affected areas where a BC ratio of 1 may be accepted. Such a dilution of the criterion was presumably considered justified on the social ground that drought-prone areas needed special consideration from the state.

2.8 At the same time, the Commission was conscious of the deteriorating financial position of irrigation works. They observed:

"The application of the benefit-cost ratio criterion in recent years has, however, had certain undesirable effects; it minimises the importance of securing an adequate return from investments on irrigation projects. We feel that this trend must be checked. We recommend, therefore, that at the time of considering a project for acceptance, the financial return of the project should also be carefully

examined. If the return does not cover working expenses and interest charges on capital, the impact of the project on the irrigation revenues of the State should be examined to see if an upward revision of water rates in the State would be necessary. If an upward revision appears to be necessary, the State should be advised accordingly at the time of conveying approval of the project." (GOI, Min. of Irrigation & Power, 1972:253).

2.9. They also went on to add:

"There is a view that irrigation projects should be undertaken not as much for the purpose of earning revenue but as a measure of social welfare and that the irrigation rates should be kept low. This approach would be valid if the benefits from irrigation projects were more or less evenly distributed over the entire farming community. But this is not the case as the main beneficiaries are only a section of the cultivators in the command area. It would be highly inequitable to call upon dry-farmers and the general tax-payer to pay for benefits enjoyed by irrigators. We are, therefore, of the view that irrigation works as a whole should give an annual income at least equal to their annual cost of operation and that no part of the burden for providing irrigation should fall on the general tax-payer," (ibid, 264-5).

2.10. Meanwhile the problem of cost-recoveries from public irrigation systems was beginning to command wider attention. The Public Accounts Committee in a report presented to the Lok Sabha in 1983 noted that there were enormous cumulative losses from investment on irrigation. They were in agreement with the recommendations of the Irrigation Commission on not subsidising the irrigated farmers at the cost of the general tax-payers. The Committee was of the view that it was imperative that irrigation works be made to pay for the maintenance, operation and depreciation charges and also yield some interest on the capital. The Committee also observed that there was no regular system of assessing the actual economic return of the projects. They recommended that evaluations of projects at five-year intervals should be carried out to find out to what extent the economic benefits envisaged in the project report have been actually realised and what steps should be taken to ensure optimum economic return.

2.11. The procedures for the cost-benefit analysis of irrigation projects were reviewed in 1983 by a Committee constituted by the Planning Commission (GOI, Planning Commission: Report of the Committee to Review the Existing Criteria for Working out the Benefit Cost Ratio for Irrigation Projects, February 1983). This Committee recommended replacing the benefit-cost ratio by the internal rate of return (IRR) criterion and suggested that projects should normally earn a minimum IRR of 9% to qualify for approval; however, in drought-prone, hilly areas and in areas where 75% of dependable flows of the basin had been utilised, a lower minimum IRR of 7% was prescribed. It must be noted that the mere change from BC ratio to IRR does not necessarily mean a better cost-

benefit analysis. The Committee did make a number of recommendations to improve the methodology and data base for social cost-benefit analysis, but these have not yet been fully implemented.

2.12 The National Conference of Irrigation and Water Resources Ministers in 1986 noted that the prevailing water rates were too low to meet even the operation and maintenance charges, and wanted the rates to be increased, gradually taking into consideration the rising cost of irrigation projects, in regard to both capital outlays and operation and maintenance charges. They felt that the rates should be such as to provide signals to the beneficiaries regarding the precious value of scarce water supplies. The Conference decided that a Committee should be constituted to examine the "need for adequately maintaining the irrigation assets" and give their recommendations. This Committee (Jakhade Committee), set up in 1987, recommended certain norms regarding the operation and maintenance grants to be given to different categories of projects.

2.13 The National Water Policy adopted in 1987 envisaged a somewhat stiffer norm, though still far short of full cost recovery, for fixing/revising water rates:

“Water rates should be such as to convey the scarcity value of the resources to the users and to foster the motivation for economy in water use. They should be adequate to cover the annual maintenance and operation charges and a part of the fixed costs. Efforts should be made to reach this ideal over a period, while ensuring the assured and timely supplies of irrigation water. The water rates for surface and ground water should be rationalised with due regard to the interests of small and marginal farmers”.

It also emphasised that structures and systems created through massive investments should be properly maintained in good health, and that appropriate annual provisions should be made for this purpose in the Budgets. The assertion that water rates should cover annual maintenance and operation charges and part of the fixed cost, if not the full cost, is noteworthy. It is against this background that we must review the existing system of water pricing.

2.14 The Fifth, Sixth and Seventh Finance Commissions suggested that the financial returns should not only cover working expenses but also a specified percentage of interest on the capital investment. The Fifth Finance Commission specifically recommended a rate of return of 2.5 per cent on capital invested while the Sixth and Seventh Finance Commissions adopted a lower norm of 1 per cent. When **even** this whittled down standard was not met, the Eighth Finance Commission exhorted a minimum effort from the State Governments to ensure that the receipts cover at least the cost of maintenance. The Ninth Finance Commission observed that the fiscal position had since worsened because of the dismal financial performance of the irrigation works. It also adopted the diluted norm of the Eighth Finance commission namely that the receipts should cover at least the cost of maintenance.

Water Rates: The Present Position

Main Features of Water Rates:

2.15 The Central Water Commission (CWC) has compiled, for all major States, information regarding the principles which have guided the rates charged by them for surface irrigation, along with details of the rates chargeable for different crops and categories of sources and the guidelines for the grant of remissions. On the basis of its latest compilation (GOI Central Water Commission: 1988), the general features can be summarised as follows. (For State-wise details of current rates, see Annexure-2.1)

2.16 Except in Assam and the North eastern States which do not levy irrigation rates, all States charge directly or indirectly for the use of irrigation water from public sources. In some States (notably Andhra Pradesh and Tamil Nadu) there is no separate water rate for areas under the old systems (including minor surface irrigation systems). Lands irrigated by these systems are classified as 'wet lands' for purposes of land revenue. Being more productive 'wet lands' are charged at a much higher rate than dry land. Within wet lands there is a further differentiation by quality of soil and irrigation source ¹. The difference between dry and wet assessment can be construed as a 'water charge' determined on the basis of productivity impact as assessed at the time of the Revenue Settlement. The last such settlement was done some 50 or more years ago and there has been no revision in the basic rates of land revenue since. However, in respect of second/third crop raised on wet lands using public irrigation sources both States charge a separate water levy called irrigation cess. In respect of systems constructed in the post-Independence period, they charge separate water rates for irrigation from public systems.

2.17 In all other States lands irrigated by public systems are charged separate water rates. As a rule, these rates are levied on area actually irrigated; they are invariably differentiated by season and crops. In many States, the rates are further differentiated by categories of irrigation projects to allow for differences in the quality of irrigation as reflected in the quantum, duration and assurance of water supplies. For example Bihar distinguishes between perennial and non-perennial canals; and sources which are assured and those which are not. Even more elaborate classifications are in vogue in Orissa and Uttar Pradesh.

2.18. Within this general pattern there are some notable variations in particular States. Thus, Orissa charges a basic water rate on all lands within the culturable command of a project for the supply of water, whether used or not, for the staple kharif cereal crop of the area (generally paddy), and individual water rates for non-staple crops. Bihar makes a distinction between "long lease", "seasonal lease" and "single watering". Some (Maharashtra, Madhya Pradesh) make a distinction between demand rate and agreement rate.

1) Vestiges of this system are to be found in several other States.

2.19 The crop-wise rates, in general, are highest for perennial cash crops like sugarcane and banana, and lowest for irrigated dry (ID) seasonals; paddy is charged at a higher rate than ID. In several States the rates for paddy differ according to season; in general too rates vary according to season, with the rates for hot weather seasonals being considerably higher than during the monsoon season. In Maharashtra the rates are differentiated primarily by season, but hybrid seed crops and hot weather cash crops are charged at a substantially higher rate than others.

2.20 The rates are generally uniform within a State for a given class of irrigation works. But there are significant exceptions. Haryana has classified its canal system into three broad groups for purposes of rate determination. Rajasthan charges different rates for irrigation works _ constructed before and after 1952. In Tamil Nadu, as mentioned earlier, lands served by old irrigation systems pay a 'wet assessment', a distinction being made between 'wet lands' and 'dry lands' irrigated from a government source. In respect of new irrigation sources, special rates for water cess and special crop-wise rate are prescribed; but these rates are not the same in all projects.

2.21 Besides water rates a few States levy general or special purpose cesses on irrigated areas/crops (see Annexure-2.2). The most prominent of these is Maharashtra which collects a local cess of 20 paise per rupee of water rate; an education cess on selected irrigated crops on a per hectare basis, and an employment guarantee cess per hectare of irrigated agricultural land. Andhra Pradesh and Kerala are two other States which report the collection of irrigation cess but the magnitude of collections is very small (Table 2-1).

2.22 Lift irrigation from public sources - which could be either government canals or public tube wells - are' invariably charged at a rate higher than for surface irrigation. In the case of tube wells, charges, being on the basis of hours of watering rather than area, approximate to volumetric pricing.

Basis underlying Existing Rates:

2.23 The CWC survey indicates the considerations which, according to the States, have gone into the determination of the rates. The considerations mentioned include quantum of water consumed, paying capacity of irrigators, assurance of supplies, and need to .cover annual costs incurred in providing irrigation. Some States feel that cash crops must bear a higher charge relative to production than food crops. Most of these principles have been referred to and commended by the Irrigation Commission of 1972 (Annexure- 2.3). However the Commission did not indicate how exactly the various considerations were to enter the determination of rates and how they were to be balanced. In any case, the response of the States as reported by the CWC suggests that there is no uniformity or consistency of practice among the States in this

Table 2-1**Collection on account of General & Special Purpose cesses on Irrigated Area/crops in some States - 1974-75 to 1986-87****(RS. Lakhs)**

State Year	Andhra Pradesh	Haryana	Karnataka	Kerala	Maharashtra	Tamil Nadu	All India
	(BL)	(BL)	(BL)	(BL)	(BL)	(BL)	(BL&IC)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1974-75	28.19	43.47	0.10	0.46	66.53	3.02	142.34
1975-76	0.01	37.17	12.44	0.51	4.34	18.95	73.37
1976-77	2.18	8.00	2.15		10.34 (-)	12.22	10.45
1977-78	12.83	--	17.71	--	15.39	--	45.93
1978-79	--	0.62	12.62	---	28.13	4.24	45.61
1979-80	7.72	1.00	--	--	20.80	3.46	32.98
1980-81	8.40	--	--	--	21.73	2.33	30.13
1981-82	4.42	--	--	42.07 (IC)	12.61	--	59.10
1982-83	1.99	--	--	30.61 (")	117.23	8.19	168.02
1983-84	--	--	--	52.67 (")	146.89	91.93	330.15
1984-85	--	--	--	42.30 (")	131.29	3.61	177.10
1985-86	17.34(IC)	--	--	51.07 (")	160.75	2.35	231.51
1986-87	--	--	--	34.69 (")	131.33	--	168.90

BL = Betterment Levy IC = Irrigation Cess

Source: Financial Aspects of Irrigation and Multipurpose River Projects - May, 1990 - CWC

matter. It is also clear that for greater precision regarding the criteria governing rate-fixation and their translation into specific rates.

2.24. Consider for example the relation between rates and water requirements. On the basis of data for six States (GOI, Central Water Commission: 1991) regarding the depth of irrigation 'for major crops and the corresponding per acre charge for irrigation, we have worked out the charge per ha cm of water for different crops (Table 2-2). In all six States, crops consuming more water for irrigation also pay more per hectare. However, the rate per unit volume of water consumed varies greatly across crops. In most States, water-intensive crops like paddy and sugar cane are charged less per ha-cm than coarse cereals and oilseeds (and, in some cases, less than pulses', all of which require relatively little irrigation. In the case of perennial crops like sugar cane, since considerable evaporation losses occur in carrying storage over the year, there is a strong justification for the rate per ha cm to be even higher than for seasonal crops. This, and the wide variability in the level and structure of rates/ha cm suggest that there is scope for a rationalisation of the rate structure.

Table 2-2

Water charges per unit area and per unit volume for selected crops and states

Crop	States																		
	Gujarat			Karnataka			M.P.			Orissa			Punjab			UP			
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
					*													***	
Paddy Coarse	91	110	1.21	78	87	1.12	100	59	0.59	85	40	0.47	123	48	0.39	87	98	1.13	
cereals	18	40	2.22	30	49	1.63	15	47	3.13	41	21	0.50	20	30	1.50	26	88	2.62	
Wheat	75	110	1.47	83	54	0.65	63	76	1.21	38	32	0.84	51	29	0.57	52	98	1.88	
Pulses Sugar-c	23	00	2.61	29	37	1.28	49	42	0.86	25	19	0.76	16	24	1.50	42	66	1.57	
cane Oil-	278	830	2.98	251	370	1.44	169	297	1.76	122	100	0.82	160	149	0.93	172	198	1.15	
seeds	60	100	1.67	30	59	1.97	24	54	2.25	69	26	0.31	44	32	0.73	17	68	4.0	
Cotton	107	100	0.93	96	99	1.03	40	59	1.50				59	33	0.56	59	35	0.59	

1. Depth of irrigation in Cm

2. Rate per hectare (Rs.)

3. Rate per hectare cm (Rs.)= (2)/(1)

* For the first paddy crop.

** To be harvested within 12 months.

*** Average for prevalent rates for Schedule I, II and III Canal System

Source: GOI, CWC, An Overview of Water rates for surface irrigation, Oct.1991 Appendics.

2.25 The Irrigation Commission had suggested that water rates should be fixed at around 5 per cent of gross income for food crops and 12 per cent for cash crops. At present, the actual gross receipts per ha of area irrigated by major and medium projects is barely 2 per cent of the estimated gross output per ha of irrigated area, and less than 4 per cent of the difference between output per hectare of irrigated and unirrigated areas (Table 2-3). The incidence varies a great deal across States, but in no State does the gross receipt per hectare account for more than 3 per cent of the gross productivity per hectare of irrigated area . As a proportion of difference in productivity, it is below 5 per cent in all but 2 States. Since the gross receipts include several items other than water charges and cesses levied on irrigated land - accounting for about 27 percent

1. The extra-ordinarily low incidence in Andhra Pradesh and Tamil Nadu is probably due to the fact that indirect levies on irrigated areas (by way of higher rates of land revenue on wet land, betterment levy and irrigation cesses) are not properly reported under irrigation. It has been estimated (Guhan 1989) that in the case of Tamil Nadu, the irrigation component of land revenue during 19 85-90 was nearly three times the

collection by way of water rates. The CWC, compilation entitled "Financial Aspects of Irrigation and Multipurpose River Projects" (May 1990) reports "nil" under the former head for most years in both states.

At the time of publication, the findings/recommendations contained in this report are under examination of the Planning Commission, Government of India and, therefore, must not be taken as having the acceptance of the Planning Commission/Government of India.

Table 2-3

Incidence of Gross Receipts from Major and Medium Irrigation Projects relative to Productivity of Irrigation

State	Gross receipts per hectare GIA	Value of production per ha of irrigated area	(1) as % of (2),	Difference between irrigated and unirrigated productivity	(1) as % of (4)
	(Rs)	(RS.)		(Rs)	
	(1)	(2)	(3)	(4)	(5)
A. P.	27	6689	0.4	4407	0.6
Bihar	33	2993	1.1	714	4.6
Gujarat	139	6353	2.2	3639	3.8
Haryana	70	4462	1.6	3169	2.2
Karnataka	58	6825	0.8	4528	1.3
M.P.	90	3391	2.6	1735	5.2
Maharashtra	140	7415	1.9	5812	2.4
Orissa	66	3958	1.7	1770	3.7
Punjab	53	5997	0.9	3370	1.6
Rajasthan	93	3426	2.7	2405	3.9
Tamilnadu	9	6689	0.1	4364	0.2
U.P.	111	3875	2.9	1555	7.1
West Bengal	7	5634	0.1	2457	0.3

- 1) Gross receipts from CWC 1990, relates to averages for 1984-5 to 1986-7. Gross Irrigated Area (GIA) by major and medium projects based on Planning Commission estimates of utilisation (1986-87).
- 2) Estimates taken from an unpublished study by Vaidyanathan and Rajagopal, 1992, are averages for 1979-83 and relates to total irrigated area from all sources. Outputs valued at average price of 1986-87.

of the total receipts during the early 1980s ¹ - the incidence of irrigation charges per se must be considerably lower.

2.26 A better basis for comparison would be the amount levied as irrigation charges (including indirect levies) but the data are not easy to come by. On the basis of information available to the Committee (Table 2-4) the annual demand by way of irrigation charges relative to the average productivity of irrigated areas works out to between 0.4 per cent and 4.1 per cent - all considerably lower than the incidence computed on the basis of gross receipts. The incidence measured by the prescribed rates for selected major crops (see Table 2-5) is also seldom more than 3 per cent of the gross output per ha. ²

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- 1 During the quinquennium ending 1986-87, the annual gross receipts from major and medium irrigation and multi-purpose projects averaged Rs. 1550 million. Two thirds of this is accounted from revenues from the sale of water for irrigation and around 6 per cent from indirect revenue on account of irrigation; a little over 5 per cent was contributed by revenue from sale for non-irrigation purposes and 22 per cent from "other receipts".
 - 2 Allowing for subsequent rise in prices and yield, this incidence computed with reference to more recent data will be considerably lower than that indicated in Table 2-5.

Table 2-4**Incidence of liability for Irrigation Charges per se relative to productivity of irrigated land**

State	Period	Average demand Rs. lakhs	GIA 5 10	Water rates Demand/ha Rs/ha	O/GIA Rs.	(5) as % (6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Bihar	1986-89	872	25.6	34	2993	1.1
Gujarat	1986-89	909	8.9	102	6353	1.6
Haryana	1987-90	1112	18.1	61	4462	1.4
MP	1986-89	2190	15.6	140	3391	4.1
Maharashtra	1986-89	1908	11.7	163	7415	2.2
Orissa	1986-89	946	15.5	61	3958	1.5
Punjab	1986-89	958	25.2	38	5997	0.6
UP	1986-89	6090	59.7	102	3875	2.6

GIA = Gross irrigated area at the end of 1989-90 CWC, Water and Related- Statistics (April, 1992).

O = Output

O/GIA= Value of output per ha. of gross **irrigated area from all sources** as estimated by Vaidyanathan and Rajagopal.

The figures on total demand as reported by the States (See Annexure 5-1).

Table : 2-5**Surface Water Rates**

State	GVO/ha	Paddy	as a % of GVO/ha	Wheat	water rate		Sugarcane	water rate	as a % GVO/ha
		water rate		GVO/ha					
Andhra Pradesh	5413	222 ¹⁾	4.1				14320	370	2.6
Bihar	3918	89	2.3				7339	158	2.1
Haryana	5329	74	1.4	4333	61	1.4	6279	99 2)	1.6
Karnataka	6196	99	1.6				18512	556	3.0
Maharashtra							17663	750	4.2
Madhya Pradesh	2529	59	2.3	2645	76	2.9			
Orissa	3814	40	1.0						

Punjab	7494	49	0.6	5008	29 3)	0.6			
Rajasthan				3950	74	1.9			
Tamil nadu	5935	^{49 3)}	0.8				19273	^{62 3)}	0.3
Uttar Pradesh.	3600	143	4.0	4142	143 4)	3.4	8300	237	2.8
West Bengal	5216	125	2.4						

The gross value of output (GVO) per ha relates to 1983-4 except for Paddy in Haryana (1984- 5), Sugarcane in UP (1984-5) and Paddy in Tamil Nadu (1981-2). All figures are from GOI, Ministry of Agriculture., Cost of cultivation of Principal crops in India (N.D.1991). Since they relate to the overall average for irrigated and unirrigated areas, the output per ha. of irrigated area is likely to be higher, the difference being greater when the proportion of unirrigated area is higher. The water rate used, in the calculation is the highest chargeable for surface water for the particular crop in the state at present. On both counts, the incidence of water rate relative to output tends to be overstated.

- 1) II or III wet crop
- 2) More than 12 months crop.
- 3) Except on Kharif Channels.
- 4) For Schedule I Canals.

Changes in Water Rates

2.27 AS already noted, the necessity to ensure that irrigation charges paid by farmers are adequate at least to cover the operational expenses and also meet a part of the interest charges has been emphasised by numerous official committees. However there has been a remarkable reluctance on the part of State Governments to implement this recommendation. Revision of water rates has been infrequent, hesitant and very much less than the increase in costs. For instance, water rates in Tamil Nadu were last revised 30 years back. In Punjab, Kerala, Haryana, Jammu and Kashmir and Himachal Pradesh, there has been no change in rates since the mid-seventies. Several, (including Andhra Pradesh, Bihar, Gujarat, Karnataka, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh and West Bengal) announced revisions during 1981-1986, but in some cases (eg., Gujarat, Karnataka) the implementation of the revised rates was held up by the Governments, and in the case of Andhra Pradesh because of stay orders from courts. The rate increases were themselves rather modest and no State has accepted, much less implemented, the Irrigation Commission's recommendation for reviewing and adjusting rates every 5 years. Only Maharashtra has within the past year broken from this pattern both in terms of magnitude of increase in rates and in announcing a graduated increase every year for the next 5 years (Annexure - 2.1).

2.28 Judging by the reported trend in revenues the impact of these revisions on users of public irrigation systems has not been significant nor have they led to any improvement in the financial performance of these systems. Between 1974-75 and 1986-87 , gross receipts from major and medium works per hectare of gross irrigated area rose by some 55 per cent. The increase in revenue

from irrigation charges per se has been considerably smaller and their share in total receipts averaged 74% in 1974-76 and has declined since to 56% in 1984-85 to 1986-87. A significant part of the increase in gross revenue is thus on account of sale of water for non agricultural uses and other receipts. (Table 2-6).

2.29 During this period, the prices of agricultural produce have roughly doubled and overall yields of irrigated crop were also rising. Even if one were to assume the yield improvement to be the result of improvements made by the farmers, for instance through conjunctive use, the incidence of surface irrigation charges relative to gross output per hectare must have declined substantially. Over the same period, costs of operating irrigated works also rose much faster. Even in the mid-seventies, the gross revenue from major and medium projects did not cover current expenses on operation and Maintenance; by the mid-eighties the gap had grown much wider. On an average, during, 1984-86 gross receipts covered only 41 per cent of working expenses compared to 78 per cent in 1974-76. (Table 2-6).

Table 2.6

Overall Financial Results of Major, Medium and Multipurpose Irrigation Projects, India 1974-5 to 1986-7

(Rs. in million)

	Gross Receipt	Working expenses	Interest on capital outlay	(1) as % of (2)	Surplus (*) Deficit (-)		Direct & Indirect * irrigation charges as % of GR	Direction and Management # as X of WE
					(5)			
					(A)	(B)		
(1)	(2)	(3)	(4)	(5)		(6)	(7)	
1974-75	607	946	1379	64.2	-339	-1718	71.0	27.7
1975-76	869	954	1577	91.1	-85	-1662	72.1	29.9
1976-77	1047	1128	1749	92.8	-81	-1830	78.0	26.8
1977-78	969	1272	2155	76.2	-303	-2458	79.0	27.2
1978-79	1080	1552	2555	69.6	-472	-3027	77.1	26.2
1979-80	1007	1405	2923	71.7	-398	-3321	80.3	30.9
1980-81	1034	2257	3015	45.8	-1223	-4238	77.7	26.3
1981-82	1202	2653	4156	45.3	-1451	-5607	77.5	27.8
1982-83	1171	2377	8727	49.3	-1206	-9933	77.8	38.7
1983-84	1650	2739	5628	60.2	-1089	-6717	81.5	35.7
1984-85	1297	3339	6357	38.8	-2042	-8399	72.0	32.6
1985-86	2249	5273	6413	42.6	-3024	-9437	74.6	33.4
1986-87	1667	4927	8506	33.8	-3260	-11766	59.0	42.5

Source: GOI, Central Water Commissions, Financial Aspects of Irrigation and Multipurpose River Projects; (N. Delhi, May 1990)

A = GR - WE

B = GR - (WE + Interest)

* Relates to Irrigation and Multipurpose River Project (Commercial)

Direct irrigation charges denote sale of Mater for Irrigation purpose & Indirect Includes otherwise/ceases etc.

Financial Performance of Irrigation Projects

2.30 These trends are noticeable in practically all States. (See Table 2-7 page 44-45). Between 1974-75 and 1976-77 on the average, gross revenues exceeded working expenses in as many as 4 States ¹) (Karnataka, Madhya Pradesh, Maharashtra, UP); in 4 the ratio of revenue to working expenses was between 70 and 100 per cent; 40-70 per cent in 4; and < 40 per cent in 2. In 1984-87 only Orissa had a surplus of revenue in two of these years, Uttar Pradesh had a revenue/WE ratio > 70 per cent; it was 40-70% in 3 States and <40 per cent in as many as 9. The all-round deterioration in the financial performance of irrigation projects is stark and nearly universal.

2.31 Table 2-6 which is based on the CWC compilation "Financial Aspects of Irrigation and Multipurpose River Projects" (May, 1990) shows that the gross receipts of Irrigation and Multipurpose Projects fell short of their working expenses by about Rs. 168 million a year on an average during the three years 1974-77; the gap had risen to Rs. 2775 million a year during the period 1984-87. Including interest on capital outlay, the deficit rose over the same period from about Rs.1737 million a year to Rs 9867 million a year. However, there are some questions concerning the coverage and conceptual basis of the above compilation.

2.32 In the first place, the CWC's compilation relates only to Major and Medium Multipurpose River Projects, and does not cover the entire irrigation sector.

2.33 Secondly, "Gross receipts" in the accounts for Major and Medium Projects cover not only irrigation charges per se, but several other categories of receipts. The wide variations across States and years in receipts by way of revenue from water sales for uses other than irrigation are also puzzling: Bihar, Haryana, Jammu and Kashmir, Orissa and West Bengal do not report any receipt under this head; accounts for 5 per cent or less in AP, Gujarat, MP, Punjab, Rajasthan and UP and about a fifth or more in others. Whether these truly reflect differences in the rates at which non-irrigation users are charged and/or in the proportion of the total water from the systems made available for these purposes needs closer scrutiny. Little is known about the nature and composition of the category "other receipts" which accounts for nearly a fifth of the gross receipts and are particularly volatile. Altogether the share of non-irrigation receipts in gross revenue varies over an extra-ordinarily wide range and its behaviour over time is not consistent or uniform; while in some States (Gujarat, Haryana and Maharashtra) the share of non-irrigation revenues has risen, in others (Punjab, Rajasthan and UP) this is not the case. On the other hand, as noted earlier (para 2.25) there is reason to believe that indirect receipts (especially the portion of land revenue relating to irrigation and irrigation cesses) which are important in States like Andhra Pradesh and Tamil Nadu are not fully captured under 'irrigation'

¹ In Punjab and Rajasthan, gross revenue exceeded working expenses in two of these years.

in the accounts.² Further, as the Government accounts are on a cash basis and do not reflect accruals, one cannot sort out how much of the poor performance is attributable to low rates per_se and how much to laxity in collecting dues.

2.34 Thirdly, figures of working expenses show rather large and erratic year-to-year fluctuations in several States; and in some States in some past years the working expenses were negative figures because of the adjustment of credits in accordance with prevailing accounting principles. Apart from this, there are conceptual problems. Since the responsibility for assessment and collection is not with the Irrigation Department in all States, and as the 'working expenses' shown in the accounts reflect only the expenses incurred by the Irrigation Department, the figures of working expenses on account of staff and establishment are not comparable across States.

2.35 Another problem relates to maintenance, and repairs; apart from Possible differences in the way wages and salaries for maintenance works are treated, there is also the larger issue whether it is appropriate to take only the actual expenditure on maintenance which is generally considered to be inadequate to keep the systems in good working condition, and is becoming less and less adequate as staff costs in most States are absorbing an increasing proportion of the total working expenses (Table 2-7)³; if full provision were made for maintenance the total cost of the service may be even higher. At the same time, the accounts include a head "extension and improvement" which prima facie is more in the nature of capital outlay than normal maintenance.

2.36 As for capital- related charges, the accounts figures include an entry relating to interest on capital; but this is calculated only on the capital outlay on major and medium irrigation projects which are classified as "commercial".⁴ There is some lack of uniformity here as

2 For several years in AP and TN the accounts show "nil" against revenue (direct and indirect) from irrigation. This is also seen in Karnataka and Kerala.

3 Note that this is the case in 11 out of the 14 States. The extent of increase in the share of staff costs is relatively small in U.P. and Punjab. Of the remaining 3, M.P. shows the entire O & M expenditure under staff: while in Orissa and Rajasthan, the share of staff costs has fallen. The wide variations across States in the share of staff costs in total working expenses also attracts notice but no analysis of the underlying reasons is available.

4 This classification of projects as 'Commercial' and 'Non-commercial' is a relic of the distant past when outlays on irrigation projects were regarded as revenue-earning; the shift from financial returns to benefit-cost ratios as the basis for project approval rendered this classification meaningless, but it is still continuing in the accounts. This is a matter for the State Governments and the Comptroller and Auditor General of India to consider. Later in this report we are recommending the re-introduction of a financial return criterion for all project approvals in this sector.

Table 2.7

Selective indicators of financial performance of Irrigation and Multipurpose Projects, State 1974-1987.

State		1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87
AP	1	15.4	16.9	7.5	7.7	8.7	7.6	7.	6.6	6.7	120.2	21.8	36.9	11.4
	2	30.1	-	2.9	20.4	-	-	12.7	15.4	7.3	3.6	-	-	-
	3	21.1	19.8	4.9	17.7	22.	18.4	59.4	62.1	45.5	42.1	32.9	52.	59.2
Bihar	1	72.5	94.4	61.1	74.	39.5	47.4	63.2	39.8	49.3	58.4	29.8	29.3	14.5
	2	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.
	3	52.1	44.	52.9	49.	56.4	59.4	55.2	63.5	64.4	66.9	69.2	68.2	69.9
Gujarat	1	71.1	94.3	84.1	90.6	71.3	70.6	34.4	16.	30.8	35.6	35.4	25.8	44.6
	2	65.1	88.3	84.5	88.3	88.4	60.6	75.1	82.4	70.4	82.	65.3	67.6	11.5
	3	23.7	27.7	29.2	29.4	26.5	29.3		7.4	26.1	38.8	40.2	47.3	44.5
Haryana *	1	55.4	77.9	86.6	68.3	66.2	55.2	64.3	57.5	43.5	42.9	37.7	46.7	57.0
	2	86.5	87.7	87.7	82.2	91.8	77.5	84.4	84.2	81.2	74.6	62.8	69.7	53.3
	3	21.7	22.6	24.3	23.8	21.2	18.8	24.2	19.6	26.1	36.7	20.4	34.9	27.3
Karnataka	1	97.6	129.2	83.4	76.3	95.5	85.8	7.6	77.3	33.2	50.9	29.6	6.7	38.7
	2	56.7	75.6	87.9	89.2	90.4	-	-	-	-	-	-	-	-
	3	8.4	21.3	15.	14.3	13.3	12.	2.	19.8	17.7	27.6	11.1	6.6	35.6
Kerala	1	51.4	69.6	50.8	136.	58.7	139.2	49.5	24.4	32.	82.9	-	25.1	16.5
	2	1.2	1.	21.	43.9	52.1	67.4	46.7		-	-	-	-	-
	3	23.2	*	55.8	28.7	7.2	31.6	25.6	39.4	61	58.4	68.2	83.6	73.
M.P.	1	129.3	540.	*	*	1403.	*	24.2	30.7	28.3	44.8	30.1	41.7	33.2
	2	40.	48.1	68.4	73.	65.5	53.5	30.	53.8	72.3	45.0	52.3	37.3	42.9
	3	-	-	-	100	100	100	100	100	100	100	100	100	100
Maharashtra	1	166.	134.	98.8	97.2	79.8	93.5	93.8	94.1	78.7	61.1	47.3	48.9	43.3
	2	91.1	82.9	72.8	77.4	64.7	58.9	51.	43.1	53.1	65.6	59.4	63.1	34.
	3	48.6	49.6	46.4	42.4	49.6	49.1	53.7	52.1	54.1	49.8	54.1	54.2	54.5
Orissa	1	30.7	86.4	71.9	75.6	60.9	46.3	46.8	49.8	79.3	95.	64.2	135.	214.5
	2	--	5.2	neg	81.4	75.6	80.8	82.4	90.6	-	90.6	91.6	0.4	0.4
	3	9.9	9.	10.7	11.	7.4	6.3	6.3	13.5	9.1	10.8	32.5-	8.1	7.8

State		1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87
Punjab	1	63.2	113.4	106.7	106.5	92.3	81.7	73.8	69.3	26.6	49.9	81.5	48.3	51.5
	2	49.1	72.8	92.1	85.8	94.	86.5	64.4	93.8	93.6	86.7	90.1	91.3	89.4
	3	67	70.3	59.7	59.4	62.1	60.8	67.2	56.1	64.6	60.3	63.5	62.6	68.4
Rajasthan	1	49.5	105.	105.7	57.	65.5	66.	55.8	46.5	51.2	43.7	£43.6	19.4	16.1
	2	74.9	88.9	83.8	86.3	90.3	88.3	86.9	91.7	94.1	93.7	89.3	89.3	90.
	3	41.6	35.7	19.4	21.4	12.1	21.	36.4	33.2	29.6	28.8	23.8	8.3	15.
Tamil Nadu	1	22.4	9.9	8.6	6.9	5.3	6.4	15.6	2.5	11.	6.4	7.7	6.8	4.3
	2	26.1	21.5	-		5.8	5.7	1.4	-	8.9	64.2	4.8	2.6	-
	3	12.7	13.6	23.	10.7	12.9	27.5	27.3	10.	38.4	7.5	56.9	25.4	18.5
U.P	1	123.3	184.9	286.4	201.7	218.2	187.6	134.4	152.7	111.7	186.	8.3	105.	48.8
	2	89.9	92.3	95.9	95.5	95.8	96.2	96.7	98.5	98.3	98.4	98.1	95.9	99.1
	3	46.1	41.9	38.2	42.2	33.4	27.8	27.7	32.5	37.8	26.6	15.	43.	46.6
West Bengal	1	38.1	46.8	35.	31.5	11.2	20.8	11.	8.1	16.5	13.	8.8	7.3	4.6
	2	90.7	81.	96.9	92.3	88.8	87.3	74.6	29.1	82.2	96.4	91.9	56.7	61.1
	3	11.1	5.1	82.9	.9	74.7	90.9	10.5	8.2	88.2	86.4	73.4	78.4	86.0

1. Gross revenue as % of working expenses.
 2. Irrigation Charges (direct and indirect) as % of gross revenue.
 3. Direction and Management as X of working expenses.
- * negative

Note: In the case of Andhra Pradesh, Karnataka, Kerala, Orissa and Tamil Nadu, the zero entries and violent fluctuations reflect incomplete reporting by the States.

Source: Financial Aspects of Irrigation and Multi-purpose River Projects, Nay, 1990 - C.W.C.

some State Governments - e.g. Madhya Pradesh, Orissa - have discontinued this book adjustment. Apart from this, if we wish to work out the full cost of providing irrigation water, the capital outlay for the purpose of calculating interest (as also depreciation) has to be the entire capital outlay on the irrigation sector, covering not only all major and medium projects without regard to the commercial/non-commercial classification, but also minor irrigation and the capital outlay, if any, under CAD as well. *If* this is not feasible in the main financial accounts, this calculation has to be done in subsidiary management accounts. We shall revert to this point later.

2.37 The question arises at what rate the interest on capital should be calculated. The book adjustment in the accounts referred to earlier is understood to be carried out by the Accountants-General at rates indicated by the State Governments. We do not know the basis on which these rates are determined. The rates vary "greatly between States and in a given State over time. However, the implied average rates do not seem to bear any systematic relation either -across States or over time in a given State to the average interest paid on the overall debt of each State. Irrigation projects are for the most part funded not by loans/bonds specifically meant for that purpose, but from the general pool of state borrowing. Though interest rates and maturities of such borrowings vary, it is not possible to relate particular loans to particular uses. Under the circumstances, it is in our view far preferable and certainly simpler to assess interest costs uniformly on the basis of the average interest rate paid on the outstanding public debt of each State. We have, therefore, adopted this basis for working out the element of interest on capital in assessing the full cost of providing irrigation water.

2.38 It is pertinent to note that as a matter of convention interest charges during construction are no longer capitalized and treated as part of capital invested. There is a strong case for the capitalisation of interest during construction, if not in the main financial accounts, then in the departmental management accounts referred to above.

2.39 The capital base which should bear the interest is the other important issue. If we take the total investment, this would include projects which are still under construction and where water deliveries to farmers have not yet started. At the same time, it is rather difficult to take only completed projects because project accounts are kept open for a very long time for various reasons. Projects in many cases begin supplying water long before the projects are completed. A further difficulty is that actual costs tend to be inflated by a variety of factors (such as time and cost overruns; defects in project design; deficiencies in management; waste; leakages etc.). It seems hardly fair to calculate interest and depreciation on such inflated capital.

2.40 The problem of incomplete projects is real. In industrial and manufacturing projects there is a very clear and easily determinable concept of 'commencement of commercial operations', but this is not the case with irrigation projects. In principle it is possible to lay down standards (in terms of reaching a specified percentage of the designed irrigation potential) to determine completed projects. This is a direction in which we must move. However, for the time being we have to fall back on crude approximations. It seems difficult and inappropriate to make any arbitrary percentage allowances for the factors mentioned above. To avoid this, we decided to take the cumulative outlays three years prior to the accounting period (e.g., if the reference year is 1992-93, we take cumulative investment upto the end of 1989-90) as the base for computing depreciation and interest costs. (This takes care to some extent of the gestation problem but not the other factors referred to earlier but this is the best that can be done without incurring the

charge of arbitrariness.) In so far as; depreciation is concerned, we have taken 1% which implies a project life of 100 years.

Unrecovered Costs

2.41 We have made two alternative estimates¹ of the unrecovered costs of providing irrigation service from major and medium works in 2 years namely 1977-78 and 1986-87: (1) based entirely on the CWC's compilation, except for adding depreciation at the rate of 1%; and (2) using the figures of gross receipts and working expenses from the same source, but taking the capital base with a three-year lag, interest at the average borrowing cost and depreciation at 1%. (Table 2-8).

1 We also had the benefit of estimates of unrecovered costs made by the National Institute of Public Finance and Policy (NIPFP) based on an independent tabulation of figures from the budget documents of State Governments for two years, namely 1977-78 and 1987-88." The NIPFP tabulation covers not only Major and Medium Irrigation Projects but also figures relating to Minor Irrigation and Command Area Development. To this extent, its coverage is wider than that of the CWC's compilation. However, the NIPFP figures on gross receipts and working expenses relating to Major and Medium Irrigation Projects are substantially at variance from those in the CWC compilation, though both draw upon the same source. Capital outlay figures are closer but not identical. It has not been possible for us to reconcile these differences within the limited time available to us. Moreover NIPFP tends to understate the unrecovered cost because it takes credit for the interest receipt figuring under the head 'Interest' in the accounts, which is the result merely of a book adjustment and does not represent a genuine interest amount received from the beneficiaries. They also take into account the loans given by the Government to tubewell corporations, farmers, etc., whereas we feel that direct government expenditure and loans to others should be kept distinct. However, we have followed NIPFP in including depreciation in our calculations and adopting the average borrowing cost rather than the interest rate used in the accounts. As regards the capital-base, we have adopted a 3-year lag instead of a one-year lag as in the NIPFP tables.

Table 2-8**Estimates of unrecovered costs on Account of Major, Major, Medium and Multipurpose Irrigation Projects****(Rs.10⁶)**

	CWC ¹		OURS ²	
	1977-8	1986-7	1977-8	1986-7
Gross Revenue	969	1667	969	1667
Working Expenses	1272	4927	1272	4927
Interest on Capital average borrowing of cost	2155	8506	2113	10589
Depreciation @ 1%	600	2023	385	1406
	<u>4027</u>	<u>15456</u>	<u>3770</u>	<u>16922</u>
Unrecovered costs	3058	13789	2801	15255

Estimates cover 14 major States of the Indian Union.

¹ GR, WE and interest are as reported in the CWC publication, except for adding depreciation 61% of the capital outlay at the end of the year given therein.

² GR and WE are as reported in the CWC publication, but taking the capital base with a three-year lag from the same source, interest at the average borrowing cost and depreciation at 1% have been calculated.

2.42 On the basis of our estimate the total unrecovered costs on account of Major and Medium Irrigation works increased more than fivefold in a 10-year period from Rs.2800 million in 1977-78 to Rs.15250 million in 1986-87. If so much of the country's resources were not spent on these recurrent subsidies, productive investment (including investments in irrigation) could have been shepped up to achieve and sustain a higher level of income and employment. The extent to which the more lasting benefit achievable by the latter course has been forgone on account of the burgeoning subsidies on irrigation can be judged front the following statistics. In 1977-78 the implicit subsidies on major and medium irrigation were about one-third of the annual capital investment in this category of works; by 1986-87, the proportion has gone up to 70 per cent and is almost certainly much higher today.

2.43 The CWC's compilation stops with 1986-87 because the Combined Finance and Revenue Accounts of the Union and State Governments on which it is based is available only up to that year. We have tried to get data for more recent to no years from the accounts of State

Governments. These are given in Annexure 2.4. Unfortunately, there are problem of comparability between these figures and the figures relating to earlier years because there was a change in the classification scheme in 1987-88. Moreover, the interest calculations in the later years are based on the rates adopted by the State Governments which vary widely from State to State and are significantly different from the average borrowing cost which we have adopted in our own calculations. For these reasons we have made no direct use of the figures relating to later years but have reproduced them in the Annexure for general information. We have also presented the financial results of selected projects in certain States based on figures from the accounts (Annexure 2.5). It is not possible to extrapolate from these and draw conclusions for the State as a whole, but the calculations may serve an illustrative purpose.

2.44 The above figures do not of course present a complete picture of the total unrecovered cost on account of irrigation in as much as they do not cover minor irrigation works. The NIPFP has on the basis of data from State budgets estimated that revenue expenditure on minor irrigation in 1987-88 exceeded revenue receipts by nearly Rs.8500 million. But this is not a reliable estimate of the actual deficit for the following reasons. Since several works are under local governments, cooperatives and autonomous corporations, the figures do not give a full picture of the position relating to minor irrigation; there are also issues concerning the basis for the allocation of departmental staff and overhead costs among different categories of works and the treatment of grants and subsidies for non-governmental agencies and individuals. The determination of capital-related charges for government-owned works is also problematic as it involves clearly sorting out direct investments from loans to others. For these reasons, while recognising that the implicit subsidy under minor irrigation is substantial, we have not attempted to quantify it. But we would strongly urge that serious and detailed scrutiny of the accounting of the costs and revenues of these works be undertaken to determine the order of subsidies involved.

2.45 Unrecovered costs are essentially subsidies, but one must not assume that the entire subsidy accrues to users of irrigation. Part of it represents the costs of inefficiency in producing and distributing irrigation services on account of defective design, inordinate delays in completing projects, over-extended distributary systems, waste, and other factors which inflate capital costs; and overmanning, relatively high administrative costs, avoidably high costs of repair works and other factors which raise operating costs, and/or affect the efficacy of assessment and collection of revenue. It is not possible to determine how much of the implicit subsidy is attributable to inefficiency and how much really benefits farmers because of the under-pricing of water. Attempts to reduce the magnitude of overall subsidies must therefore focus both on improving the efficiency of planning and management of irrigation (thereby cutting costs) and on increasing the collection of user charges by raising rate and the more effective enforcement of the scheduled rates. That action on all fronts is imperative needs no emphasis in view of the large and rapidly growing magnitude of implicit subsidies.

Need for Proper Management Account

2.46 As would be evident from what has been said earlier, we experienced some difficulty in getting information relevant to our enquiry from the accounts. Successive Finance Commissions had also noted the difficulty of obtaining useful information regarding working expenses of irrigation projects, maintenance costs, and so on, from the accounts. The Seventh Finance Commission had specifically suggested that this problem should be reviewed by the Union Ministry of Finance in consultation with Comptroller and Auditor General of India. We understand that the revision of the classification scheme in 1987-88 inter-alia addressed some of these problems. Nevertheless, it appears from our own experience that some difficulties still persist. We are aware that Government accounts are essentially financial accounts, the primary aim of which is to ensure the departmental accountability for the grants voted by the legislature, though some attempts have been made to accommodate the functional principle in the classification scheme. It may therefore be necessary to supplement the financial accounts by proper management accounts maintained by the Irrigation Department.

2.47 In this connection we noted that under existing instructions the Accountants-General are required to maintain pro forma accounts in which the financial results of 'commercial' irrigation projects (major and medium) are worked out, and that this practice has fallen into disuse for almost two decades now for want of information from the State Governments. We find that fairly detailed instructions in regard to the maintenance of these pro forma accounts have been laid, down in Appendix 2 to Account Code Vol. IV, along with an elaborate set of forms (Annexure 2.6). If these had been maintained regularly, our task would have been greatly simplified. However, these would need to be revised and supplemented in a number of ways if they are to indicate the true cost of the provision of irrigation water by the government and the extent of subsidy involved, and to serve as a tool of management in determining and revising water rates from time to time. The following are some of the aspects which would need to be covered

- (i) What is needed is not merely the financial results of some projects, but the cost of provision of irrigation water in the entire irrigation sector; the pro forma management accounts would therefore need to cover all major and medium projects, and also a consolidated account of minor irrigation projects. In addition, government expenditures (capital and revenue) on Command Area Development and schemes such as the National Water Management Project should be taken into account, to the extent that these represent not merely promotional or infrastructural expenditures but also additions to the cost of providing water.
- (ii) The capital base on which capital-related charges are to be calculated should be determined in accordance with some uniform conventions, having regards to the observations in paragraphs 2.38 to 2.40 above. Among other things, the capital outlay

figure should be broken down into (a) fully completed and operating projects, (b) partially completed projects from which deliveries of water have commenced and (c) projects which are still under construction and which have not yet begun supplying water.

- (iii) Where a project serves multiple purposes and these are not separately booked in the accounts, the capital and operating costs and the receipts allocable to irrigation should be determined on some uniform principles of allocation.
- (iv) Interest on capital should be calculated at a properly determined rate (such as the average borrowing cost which we have adopted); here again a uniform convention across States is needed regarding the basis for the determination of the rate.
- (v) In addition to interest, depreciation should also be taken into account at an appropriate rate based on the projected life of a class of projects.
- (vi) There should be clear guidelines for classifying expenditure as 'current maintenance and repairs' and as 'special repairs'.
- (vii) Departmental overheads should be taken into account on an appropriate basis, except where they stand booked already as part of working expenses in the accounts.
- (viii) The cost of collection of irrigation water charges (and of other charges relating to water), whether the collection is by the Irrigation Department or by the Revenue Department, should be brought together.
- (ix) There should be a record of demands of water charges and arrears of recoveries outstanding, as also of remissions.
- (x) Direct and indirect receipts and receipts from non-irrigation revenues should be distinctly recorded.
- (xi) Reliable data should be available regarding the quantum of water released and area under different crops irrigated in each season for each major and medium project, as also for the State as a whole (including water supplied from governmental minor irrigation systems).

2.48 We recommend that the Government, with the assistance of the Central Water Commission, and in consultation with the Comptroller and Auditor-General of India, should examine the matter in the light of the above observations and develop a suitable set of revised instructions and forms which will fully serve the purposes in view.

2.49 It is not enough to lay down instructions and formats. It is equally important to ensure that the accounts are in fact maintained and kept up to date. We recommend that the engineer in charge of each system (i.e., each major and medium project and clusters of minor irrigation projects) should be made responsible for the maintenance of these management accounts, and that the Irrigation Department should consolidate these for the State as a whole and produce an annual review presenting the total picture for the State.

CHAPTER - 3

PRICING OF IRRIGATION

APPROACH AND PRINCIPLES

General Considerations

3.1 It is clear from the earlier discussion that the financial status of public irrigation works has deteriorated progressively and at a rapid rate. The reluctance of State Governments to raise water rates in the face of rising costs (even without proper provisions for maintenance and repairs), and, in many cases, the tendency to offer concessions or adopt a soft permissive attitude to the assessment and collection of water rates, obviously rest on political considerations.

3.2 However, this attitude is also sought to be rationalised on ostensibly 'objective' grounds such as the following: (1) irrigation facilities are in the nature of infrastructure critical to the achievement of targets of foodgrain production and this can be provided only by the state; subsidising irrigation water is thus justified in the larger interests of the economy; (2) in the context of a steep rise in the dependence on, and costs of, purchased inputs and the allegedly 'unremunerative' prices for the output, any increase in the price of irrigation water would act as a serious disincentive to increased production; and (3) water charges are one of the many blue taxes that farmers pay, and need have no relation to the costs incurred by the government in providing irrigation water: in judging the adequacy of the present water rates the government must take into account farmers' contribution to the exchequer in the form of excise, sales tax and various other levies.

3.3 All these are questionable propositions. It is difficult to accept the case for subsidising such a user - oriented and capital-intensive infrastructure as irrigation. The actual state of public finances in India is obviously not strong; the revenue budgets of the Central and state Governments are in overall deficit and this deficit has been growing. The Government has to borrow not only to finance practically all its investments in infrastructure but also-and increasingly-to meet the revenue deficit. Under the circumstances the government is not in a position to sustain subsidies on irrigation, or for that matter any infrastructure, on the present scale, much less to allow it to grow further.

3.4 We considered the suggestion made in the National Water Policy that small and marginal farmers be provided water at concessional rates. In our view such discriminatory pricing on the basis of farm size will be difficult to administer. The interests of the subsistence farmers will be safeguarded far more effectively by ensuring a basic level of service to all farmers and an equitable distribution of the available water. (In this context, the two part tariff proposed later in this report would safeguard the interest of small farmers).

3.5 There is a widespread tendency among farmers to regard water rates as a tax akin to other taxes and cesses; our attempts to explain that this was a price for a commodity supplied by the government and not a tax did not seem to make much impression. To our surprise we found this opinion echoed in a more sophisticated manner by some experts with whom we had discussions. Briefly, the point of view is that there need not be any connexion between the costs incurred by the government in constructing and operating irrigation systems and the water rates charged to the farmers; that the latter is a source of revenue like sales tax or excise; that if meagre revenues are realized from one source, this could be made up from other sources; and that whether water rates should be raised or lowered is a fiscal question for the government to decide and for the legislature to approve, and need not be argued on the basis of costs. On this theory, the question of under-recovery of costs would not arise at all.

3.6 This view must be firmly rejected. If everything that a government collects is regarded as a tax, this would apply not only to irrigation water but to all supplies and services provided by the government; the concept of 'user charges' would disappear altogether, and there would be no 'under-recovery' or 'subsidy' in any sector. Such a point of view is patently untenable. There is a valid distinction between the tax and non-tax revenues of a government, and non-tax revenues would include, among other things, user charges for supplies made or services rendered.

3.7 It is well recognised that a service or facility which is in the nature of a public good (for example defence, police forces or public parks) whose benefits accrue to the community at large rather than to identifiable individuals/groups, cannot be priced. But where a specific good or service is provided by the government to individual users who can be identified and the magnitude supplied to each can be measured, a user charge for that good/service is feasible and justified. Public transport, higher educational establishments, drinking water supply and irrigation fall in this category. Water rates are therefore a form of user charge and not a tax. It may be argued that higher education facilities, public transport and electricity supply, though directed to identifiable groups, are subsidized at the cost of the general public. We are aware of this and we believe that these sectors should also operate on the user charge basis, and that their financial viability should be gauged from the service charges to be recovered from the identifiable groups, it follows that the basis for determining the cost on of the irrigation service and the desirable extent of recovery may be debatable, but not the principle that users of public irrigation must meet the cost of the service.

3.8 The argument that adjustments in prices, taxes and subsidies for a particular input should bear some relation to changes in the prices of other inputs and of the output output has greater force, but this should not become an alibi for avoiding action to correct even glaring distortions. As a practical matter there is no escape from tackling the problem step by step though this should ideally form part of a strategy for rationalising the price structure as a whole over a period. Irrigation is one of the key inputs for crop production in as much as the productivity

impact of better seeds, fertilisers and other inputs is critically dependent on the way water is used. It is therefore both legitimate and necessary to address the pricing of this input as one of the first steps and an integral component in the process of rationalising the totality of the price structure, and raising the efficiency of water use.

3.9 An upward revision of the prices of key inputs (such as water and fertilisers) does not necessarily lead to the entire increase being reflected in the form of higher costs. In so far as a more efficient water-use reduces the quantum of water per unit area without affecting output per unit area, there may be a reduction in the real burden of water charges. In fact a more efficient water-use is likely to raise production per hectare. We have already seen that the amounts paid by farmers for surface water is a miniscule fraction of total output value. There is considerable scope for the more efficient use of irrigation (sense of getting more output per unit of input) by reducing the wasteful use of water and/or paying greater attention to managing it better, thereby also facilitating the more efficient use of complementary inputs. For example, more efficient water management enhances yield-response to fertilisers. Keeping the prices of inputs much below their cost and unrelated to their consumption removes one important incentive for users to be concerned with efficient water-use.

3.10 The underpricing of water adversely affects the availability of resources for the management of irrigation systems. Inadequate allocations for maintenance and repairs is a direct consequence of the poor financial position of the States, and is responsible for the low, possibly deteriorating, quality of service. This means that the potential increases in productivity which new technology makes possible cannot be realised in full.

Towards full Cost Recovery

3.11 Another relevant consideration is that irrigation, especially major and medium irrigation works, absorbs a large amount of resources mobilised at high cost by the government. The benefits, however, accrue only to a limited area and population. Between 1950 and 1990 government investments have added an estimated 23 million ha to gross irrigated area equivalent to approximately 17 million hectares of net irrigated land. By comparison the area under rainfed cultivation - where productivity is low and liable to larger fluctuation - is nearly 100 million hectares. By any reckoning the benefits accruing to those who have access to the water provided by public irrigation systems are substantial. And there is considerable unexploited potential - not only in major and medium works, but through minor irrigation as well.¹

¹ According to Planning Commission, the gross area irrigated is expected to be 71 million ha by 1990; the actual figure may be lower. The estimated ultimate potential is 113 mha from all sources of irrigation. The corresponding figures for surface irrigation - which is and will remain in the public sector - are 38 million ha and 73 million ha respectively. While the

3.12 Given the parlous state of government finances, the possibility of extending the benefits of irrigation to new and wider areas will be severely constrained if people who are already benefitting from public investments do not bear the costs of the services that they receive. Any policy which through improved water-use efficiency has the potential to benefit a large number of farmers can surely be expected to be politically more acceptable than the continuance of the present system of heavily subsidizing the service to a relatively small number of beneficiaries. The case is even stronger in so far as the benefits of under-pricing accrue to the relatively better-off farmers and regions. A revision in the level and structure of water rates is thus necessary in the interest of both efficiency and equity. The revision should be such as to achieve full cost recovery in due course and in the process promote saving, create disincentives for waste and thereby enable the service area to be expanded and a more reliable service assured especially to those who within the command suffer from irregular and uncertain supply. Concurrent efforts to rationalize the rate-structure and make improvements in the physical system and its management are necessary to ensure that the gains, in terms of the number of beneficiaries of an extended and improved service, outweigh the disadvantages to a small number who have to forgo their present undue privilege.

3.13 There is evidence - for instance the system tanks of Tamil Nadu - that the farmers even now bear substantial extra costs on their own to secure supplies from surface sources. Moreover, it is common knowledge that farmers pay several times more for lift irrigation and for groundwater (especially from private systems) than for canal water. There are instances of farmers paying as much as a third of gross produce for getting irrigation from private wells and tube wells.

3.14 That they are reluctant to pay even 4-5% of the gross produce for canal irrigation may of course be due, in some degree, to a deep-seated tendency on the part of users of public services in India to assume that the state is obliged to provide these services at a 'cheap' rate. At the same time, the willingness of farmers to pay more for ground-water than for canal water has also something to do with the fact that the former involves less waste in conveyance and application, permits farmers greater control over when and how much water to apply and, therefore, enables them to produce much more per unit of water supplied at source, than canal water.

Need to Improve Quality of Service

3.15 While it is not possible, even in well-managed surface systems, to achieve the quality of water control which is feasible with groundwater, there is clearly much room for improvement in the quality of service provided by public systems (both canals and tanks). At present the

estimates of ultimate potential need to be treated with considerable circumspection there is no question about the scope for the expansion and improvement of irrigation in India.

managements of canal systems are unable to accept any obligation regarding the quality of water supply or to make sure that systems are constructed and managed as economically as possible for a given standard of service; sizeable segments of the command do not get; any water at all or get much less water than their crops need; the supplies tend to be quite unreliable in terms of quantum and timing; there is hardly any cost consciousness. Typically systems are over capitalised; huge time and cost over-runs are allowed to pass without much scrutiny; over-manning and relatively high overheads inflate operational costs. These problems are compounded by the adoption the farmers of cropping patterns very different from those assumed at the time of project formulation.

3.16 We are convinced that users of public irrigation can be asked and will be willing to pay much more for water, provided (a) they are assured of a better quality of service (covering quantity, duration and schedule of water supply) and the rates are linked to this; (b) they are convinced that the allocation rules/ procedures are fair and enforced in a non-discriminatory manner; (c) they are not asked to bear the burden of high costs resulting from inefficiency and waste in the government; and (d) the systems demonstrate a greater concern for keeping costs down. In the light of the above considerations, it would be far too simplistic to view the problem as merely one of revising the level and structure of water rates to cover the O&M and part or all of the capital costs. Revision of water rates should go hand in hand with measures to improve the quality of service and to keep a check on costs.

Pricing for Domestic and Industrial Use

3.17 Improving cost recovery from public irrigation systems is not exclusively a matter of adjusting irrigation rates and ensuring proper assessment and collection. A part of the water from these systems is used for domestic purposes and industrial uses (including thermal power stations). Data on the extent of non-agricultural uses are scanty. The response to our requests for such information in respect of selected projects has been poor. However, it is apparent that the revenue from the sale of water for non-irrigation purposes is substantial and increasing. As pointed out earlier, for the country as a whole during 1982-86 it averaged around 5 per cent of the collection collection (direct and indirect) on account of irrigation in some States, the proportion is much higher being as high as 20-25 per cent in MP. Since the relevant columns in the data compiled by the CWC are wholly or partially blank in several States and the values are volatile, there is reason to suspect that these receipts are not fully brought out in the published compilation. Available information on the revenue from non-irrigation uses is presented in Table-3-1. But without knowing the basis on which the rates are determined and the volume of water which is supplied for these purposes, we are not in a position to make any comments on the existing system of pricing non-irrigation uses.

3.18 The importance of this aspect for irrigation pricing cannot however be ignored. In so far as non-irrigation uses are not charged the full cost of providing water and total revenues from

irrigation projects are expected to cover overall costs, the rates charged for irrigation will be higher than they should be. This inequity will be aggravated if, as is very likely, the volume consumed by domestic and industrial uses increases rapidly. For this reason it is imperative that State Irrigation Departments undertake urgently a detailed assessment of (a) the quantum of water supplied by irrigation systems for various non-agricultural uses and the expected growth in supplies over the next decade or so; (b) the costs of supplying water for various important non-agricultural uses; (c) the experience, regarding the assessment and actual collection of dues. In the light of such an assessment, the rates for non-agricultural uses should be revised so that the costs are fully recovered and arrangements built into the supply contracts for ensuring full and prompt recovery of dues. This should, however, not result in the neglect of improving recovery on account of irrigation.

TABLE : 3-1

STATEWISE REVENUE FROM SALE OF WATER FOR NON-IRRIGATION PURPOSES - 1974-86

State/ Year	1974-75	75-76	76-77	77-78	78-79	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Andhra Pradesh	1	1	2	6	8	13	8	6	6	5	7	1200	7
Bihar	--	--	--	--	--	--	--	--	--	--	--	--	--
Gujarat	51	16	18	14	22	36	34	39	57	85	87	53	50
Haryana	20	17	15	32	11	29	--	--	--	--	--	--	--
Karnataka	5	6	4	7	35	--	--	--	--	--	--	--	--
Kerala	--	1	6	8	8	12	29	3	6	9	6	--	13
Madhya Pradesh	47	71	25	41	82	110	36	135	74	173	118	427	450
Maharashtra	29	30	84	64	48	76	74	97	126	93	161	224	338
Orissa	----- Neg. -----												
Punjab	83	95	26	18	18	20	7	16	22	43	54	36	49
Rajasthan	13	11	40	25	6	30	26	13	20	18	39	24	37
Tamil Nadu	28	28	67	27	21	24	124	19	24	7	25	27	32
Uttar Pradesh	12	15	17	16	16	14	13	14	13	14	15	23	13
West Bengal	--	--	--	--	--	--	--	--	--	--	--	--	--
All India	292	292	304	259	276	364	343	344	348	447	511	2014	988

Source: Financial Aspects of Irrigation and Multipurpose River Projects - C.W.C., May/ 1990 Figures Related to Irrigation Projects (Commercial).

(-) Denotes that the relevant figures under this head are not reported in the CWC compilation.

Relevance of Productivity for Determination of Irrigation Rates

3.19 Most previous committees which have gone into the criteria for fixing irrigation rates have suggested that besides costs, the farmers' capacity to pay should also be taken into account while determining rates. Thus the committee of State Irrigation Ministers reviewing the problem in 1964 suggested that the water rates should be fixed at 25 to 40 percent of the additional net benefits keeping in view variations in relevant meteorological, hydrological and economic factors. Where the additional net benefit could not be calculated, it was suggested that the rates should be related to the gross income from irrigated crops. The Irrigation Commission of 1972, finding that the data availability for assessing the net benefit from irrigation had not improved much, recommended that the rates should be fixed as a proportion of the gross income of irrigated crops, but suggested that the proportion recovered as water rate should be lower for cereal crops (5 percent) than for cash crops (12 per cent).

3.20 A closer examination reveals several conceptual practical problems in applying the productivity criterion. In the first place, the productivity impact of irrigation cannot be judged on a crop-by-crop basis, as it depends very much on how cropping intensities and crop combinations change as a result of irrigation; on the quality of irrigation service; and on the status of plant-breeding, fertilizer practices and other elements of biochemical technology. Moreover, estimates of overall productivity - impact in terms of gross or net output for different categories of irrigation in different regions are still not available. The lack of interest on the part of Irrigation and Agriculture Departments in most States to remedy this lacuna is striking. It is possible, however, to get approximate estimates even with available data provided a special effort were made. They can be progressively refined through properly designed sample surveys on a continuing basis. We would strongly urge that this task be taken up with far greater seriousness than has been apparent so far. Besides, fuller use of data from existing costs of cultivation and sample crop-cutting surveys, as well as periodic sample surveys of farm business in selected project commands, should be encouraged. We strongly recommend that the design for regular crop cutting surveys should make irrigated land as a whole, and preferably by major types, a separate stratum for the purposes of yield-estimation

3.21 The problem of translating overall productivity impact rates for particular crops remains. Prescribing upper limits to the proportion of benefits which can be levied by way of water charges is necessarily arbitrary: at any rate prescribing different limits for food and cash crops is not particularly meaningful. There is also the question of how cost-recovery principle, the capacity to pay principle and the encouragement of efficient crop patterns will be in determining the level and structure of rates.

Cost Recovery as the Basis for Rates

3.22 In view of the above, and the severe resource constraints facing the government, we are of the view that cost recovery should be the main consideration governing rate determination. It does not imply the neglect of water productivity. Measures to optimise the productivity improvements relative to the costs incurred by the government - and these include attention to economical design and construction of systems, determination of crop patterns and operating procedures after a more careful and not an objective analysis of available options under specific agro-climatic environments and improved management of the system - are indeed very important and call for action in the domain of project planning, implementation and management. Making them a criterion for rate fixing would however introduce avoidable complexity, and may well distract attention from the reforms needed to raise the efficiency of irrigation investments. What we need are simpler, more transparent and easy-to-administer principles for rate-determination. Cost recovery provides such a basis.

3.23 In translating the cost recovery principle into a specific set of rates a number of other issues have to be settled: (1) the assessment of costs; (2) the basis of levy; (3) the relation between rates and quality of service; and (4) the determination of rates for individual crops and systems.

Assessment of Costs:

Operation and Maintenance:

3.24 The cost of providing irrigation consists of three main elements: (a) operation and maintenance expenses; (b) depreciation and (c) interest on capital invested. O&M expenses in principle include the salaries of all personnel who manage the systems and regulate the release of water through the distribution network right up to the outlet; the staff engaged in the control of water distribution on the field, taking crop measurements, and billing and keeping water accounts; allowable overheads; and outlays on normal repairs to and maintenance of the system facilities, and, in the case of lift irrigation, the costs of energy and maintenance of pumping equipment. Actual O&M outlays should be available from the accounts supposed to be maintained by the State PWD/ Irrigation Departments for each major and medium project and for minor works collectively. But in point of fact, as noted already, these accounts are not kept and updated regularly. We have also referred to the need to ensure uniformity with respect to the various categories of expenses to be counted under costs including the treatment of 'overheads', and of assessment and collection costs. This has already been discussed in chapter 2.

3.25 The other important issue is whether rates are to be fixed on the basis of the actual outlays or on the basis of 'norms'. Actual outlays and their allocation as between staff and maintenance works are widely believed to be sub-optimal, the allocation for staff being higher than necessary and the allocation for physical works falling well short of needs. In order to correct this, it is desirable to work out norms in respect of each major category of O&M for

carrying out the tasks of maintaining and managing the systems at a reasonable level of efficiency. A procedure for the determination of these norms taking into account the differences between regions and between categories of works is outlined in Chapter 4. The suggested procedure would permit the authorities to determine the costs to be incurred by the government corresponding to different degrees of O&M responsibility assumed by users or users' groups. We would recommend that rates should be based on these norms.

3.26 Obviously if norms are to be used as the basis for levying user charges, the government must ensure that the actual outlays more or less correspond to the norms. And they should be revised periodically - say once in every five years - to take into account changes in the wage and salary levels as well as in the extent of responsibility borne by users.

Capital - related charges:

3.27 As already discussed (Chapter 2 paragraphs 2.36 to 2.40 and 2.47 to 2.49), the main issues involved in determining capital-related charges are: (1) the treatment of incomplete projects; (2) allowances for over-capitalisation arising from poor planning and execution, delays, waste and other sources of 'inefficiency' in the design and construction of projects; (3) allocation of costs between irrigation and other functions (power generation, flood control) in the case of multi -purpose projects, and between irrigation and non-irrigation uses in the case of others; and (4) the accounting rate of interest.

3.28 In principle, only the investments in projects which have been completed and commissioned should enter the computation of the costs of service. While it may not be possible to make this classification precisely with the available information, it should be possible to get a reasonable approximation by analysing project -level capital expenditures; in any case it should be easier to ensure this in respect of future projects. This applies also to the issue of allocation of joint costs. The problem of over-capitalisation arising from inefficiency/leakage cannot be objectively quantified. Any allowance, particularly a uniform allowance, is open to the charge of being arbitrary.

3.29 We recommend that State irrigation agencies undertake these analyses to arrive at a well-grounded estimate of the capital investment attributable to the irrigation service being provided currently. For the purposes of our report, we have had to use a rather crude approximation to allow for these factors. The cumulative capital outlays three years prior to the reference year for rate-determination has been taken as the basis for computing capital-related charges. We are conscious that this assumption may not adequately take care of all the factors motioned above. The interest rate used in computing the full cost of the service is the average rate on the total public debt of each State in the reference year which better reflects the cost of borrowed funds (in the situation where the extent of government investment financed from budgetary surplus is

mostly 'zero') and at the same time reflects differences in the fiscal management and hence the cost of borrowing among States.

Categorisation of Projects

3.30 Costs will naturally differ from project to project depending on age, design, and condition of structures and facilities, as well as the extent of responsibility borne by the government in their upkeep and management. The nominal value of investments per unit area or unit volume of water is also apt to vary for several reasons; the scale and the quality of service (in terms of quantum, duration and reliability of supplies per unit area) which systems can provide cover a wide range. Old projects tend to be cheaper because they exploited relatively easier sites and were constructed at a time when the costs of construction were relatively low compared to present levels. Costs of newer projects and projects with more sophisticated distribution system tend to be higher; and operating costs are rising rapidly. Under these circumstances it is arguable that rates should be differentiated by projects.

3.31 At the limit this would call for the determination/ revision of rates project by project. This, however, would result in large and widening differences in the rates charged to users of different projects and in different regions in a State. Moreover, given the high and sustained inflation of construction costs, even if a part of the capital related charges are to be recovered, a project-wise rate determination system would give an undue advantage to areas served by older systems. It is for these reasons perhaps that no State fixes irrigation rates on a project basis; most prefer uniform rates over the State as a whole. We are also of the view that some sort of averaging by region and/ or category of projects - as is already being done by several States - is desirable.

3.32 We suggest that the following categorisation will take care of significant differences in respect of quality and costs: (1) major and medium storage systems; (2) major and medium projects based exclusively on barrages/ diversion works; (3) minor surface irrigation works; (4) lift irrigation from canals; and (5) lift irrigation from groundwater¹. Where a State is large and has marked variations in agro-climatic conditions, the above categorization of projects may be done by agro-climatic region; for purposes of rate-determination.

3.33 The suggestion to charge the marginal cost was considered but was rejected since it would result in large and unjustifiable differences in water charge for the same service in the same region.

¹ We have not in this report considered the pricing of public ground-water irrigation. The principle of cost-recovery recommended by us should, however, be applicable in this case also. Volumetric pricing is obviously much easier to enforce here than in surface systems.

Avoiding Complexities

3.34 While charging uniform rates to areas served by each category of projects has the advantage of simplicity, it might be objected - especially in large systems - that conveyance losses are a function of the distance over which water is carried. It follows that the cost of delivery of water would be more at the tail end than at the head reaches, warranting a higher unit for the former. However this is offset by the fact that the head reaches have the advantage of more assured supplies and are likely to appropriate more water by virtue of their location. The balance of advantage, considering simplicity and ease of management, clearly favors uniform rates.

3.35 It has been suggested that in order to simplify assessments and at the same time to take care of differences in conditions of water supply within the command of particular system, the plots in the command be classified according to the number of years and seasons in each year for which they have received irrigation in the last five years and a flat rate charged for each category. The charge for better irrigated plots will be higher than that which gets less water and less reliable water. This procedure may be practicable in areas (especially NW India) where a statutory warabandi system has been working for a long time, but it may not be practicable in other areas. Even in the former, the flat rate system would not take into account variations in the amount of water received by each plot from year to year or differences in access to groundwater for conjunctive use.

3.36 Attempts at distinction in terms of head and tail reaches of a system, quality of soil, or other criteria for rate-determination should be approached with considerable caution as they are difficult to apply and will add to the complexity of water pricing. A better alternative and one which could be applied uniformly is to have a flat rate per unit of irrigable command and a variable levy depending on whether it is actually irrigated in a season (and eventually to be linked to the volume of water delivered). Basis for Levy : Area Vs Volume

3.37 At present water rates are almost everywhere fixed crop-wise and with reference to area irrigated. Under this system, it is essential to record and verify whether or not each individual plot comprising the command received irrigation and for what crop and in which season. The assessment and collection of charges from individual farmer is based on this record. The number of plots to be checked and the number of farmers with whom the Department has to deal being enormous, such a system is very expensive and inherently difficult, to manage.

3.38 More importantly, area irrigated is a poor indicator of the service provided by irrigation systems. The water requirements of crops vary on account of differences in (a) duration (b)

cultivation seasons; and (c) needs for non-consumptive uses(NCU) ¹ . These differences, and the fact that considerable evaporation losses are involved in carrying stored water from the wet to the drier seasons, are not adequately or systematically taken into account while fixing rates per unit of irrigated area under different crops.

3.39 Further, the productivity-impact of irrigation varies greatly depending both on what crops are grown and on how much irrigation is available, in what quantities and when. Considering the way systems are usually operated, the supply of water in respect of one or more these characteristics is far from predictable.

3.40 Except in the areas with an established tradition of warabandi users are not aware of the rationale of the rules; nor is there any effective arrangement for them to get rule-based redress for deficiencies in supply. And yet rates are fixed in relation to area and crops irrigated without any reference to the other attributes of the supply which have a crucial bearing on the user's returns.

3.41 All this argues strongly for a system, which makes water charges explicitly a function of the volume and season. Under such a system, the amount farmers have to pay gets linked to the quantities of water used by them and the quality of service. The system managers will be under pressure to rationalise water allocation procedures and make sure that they provide the designated- volume of water according to a specified schedule. Making rates a function of predictability of supplies (in respect of quantum, frequency and season) also takes care of the productivity aspect to a substantial extent; and it obviates the need for elaborate records of area irrigated by crop.

3.42 These considerations may not seem particularly relevant in the context of the low levels of water rates currently levied on users. But if rates are to be revised substantially and brought to levels more in line with costs, it is essential-both in the interests of fairness and in order to persuade the users to accept rate revisions- that the management of an irrigation system should indicate to the users clearly how much water, in what seasons, and with what frequency they can expect. The principle should also be accepted that the rate, levied has to be related to the fulfilment of these specifications. In other words any significant departure (either way) from the agreed specification should also mean a corresponding adjustment in the rates charged.

The Treatment of Wells in Canal Commands

3.43 Conjunctive use of surface and ground water in the commands of surface irrigation systems has been actively encouraged as a matter of policy and has spread widely. There are

¹ Essentially in the case of paddy, which needs water for nursery land preparation, transplantation and ponding.

some regulations concerning the location and spacing of wells in canal commands but these are not enforced strictly. In many cases the government does not charge anything from areas irrigated by wells in the command. Some states like Maharashtra have a provision for charging areas irrigated by wells within a specified distance from canals.

3.44 There are divergent views on whether or not there should be any levy on conjunctive use. The argument against charging is that extraction of groundwater in canal commands is done entirely at private cost and therefore the state has no right to levy any charge. Indeed, in so far as private pumping serves as vertical drainage and thereby mitigates water logging and salinity, it benefits the command as a whole. The arguments for charging are that most, if not all, the supply of groundwater in surface irrigated areas is ultimately derived from canals/tanks; that the benefit of conjunctive use in terms of increased productivity is substantial; and that the benefits do not accrue to every one. On the whole, we are of the view that recycling seepage from surface sources should not be taxed.

The Necessity for Volumetric Pricing

3.45 A system of pricing which takes into account the quantum, timing and reliability of supplies cannot obviously be based on the extent of area irrigated; charging on the basis of volume would be more appropriate. Under such an arrangement it would not be necessary for the system management to specify any crop-specific rates or to assess the extent of area under various crops. All it needs to do is to calculate the cost per unit volume of water delivered and collect the amount based on the actual volume of water delivered. In the process the costs of assessment and collection of revenue to be borne by the system can also be brought down substantially.

3.46 Volumetric pricing is quite common in the case of wells and tubewells, partly because the timing is controllable and, for a given well, the volume supplied is closely related to the number of hours of supply. However, it is seldom used in canals; the managers are not equipped to measure volumes of water delivered beyond the distributary levels. Even if the measurements were taken at this point-which is seldom done - it cannot be used to determine charges payable by individual farmers because each distributary services numerous (perhaps several hundred) farms.

3.47 It would not be possible in surface systems, under the best of conditions, to achieve the degree of control feasible with wells, and volumetric assessment at the level of individual farmers would be both expensive and impractical. However it is feasible, at reasonable cost, to monitor volumes delivered at the distributary outlets at different points of time. And provided the system management gives clearly specified commitments as to the quantum, duration and frequency of supplies to be made available at that point, and relates the rates payable to the

fulfilment of this commitment, we can move a considerable distance towards rationalising the basis for pricing water and making it sensitive to the quality of service as per commitment.

3.48 It does not necessarily follow that charges payable by beneficiaries be made exclusively a function of the extent to which they actually use the services (whether measured by volume of water or area irrigated) . Irrigation involves massive investments. Lands included in the command of a public system are in principle entitled to water supplied by it. The actual extent of service available and used is liable to fluctuate because of climatic and other factors. Costs, however, do not vary in proportion to the level of service. Under these conditions, there is a strong case for applying a two -part tariff - a well recognised principle of public utility pricing.

3.49 All lands included in the command should pay a flat annual fee on a per hectare basis for 'membership' of the system which entitles them to claim water and gives them the benefit of several other facilities (for instance, roads, mandies, ground-water recharge) which are associated with the spread of canal irrigation; and a variable fee linked to the actual extent of service (volume or area) used by each member. The basic rate, which has to be paid irrespective of whether a member uses water or not, would help dampen the clamour of farmers to get included in the command even when likely water supply is inadequate to serve them. (While levying a basic charge in commands of existing systems farmers can be given the right to get excluded, thereby facilitating better water management). Such a two -part tariff would be applicable in case of major/medium irrigation schemes. In the case of minor projects, whether surface or ground -water schemes, wherever the operation and maintenance of the system is completely turned over to water users' associations, the associations would be charged only the basic flat rate on a per ha basis to take care of the expenditure incurred by the Department other than those on O&M. However, till this is achieved, water charges for any minor scheme would be levied on par with major/medium schemes, based on the two-part tariff (basic flat rate and variable charges)

Preconditions for Volumetric Pricing

3.50 The move to full-fledged volumetric pricing cannot, however, be made immediately. For one thing, it will require considerable effort and also some extra investment to make the necessary modifications in regulatory structures and work out operational plans reflecting the desired balance between efficiency and equity objectives, before agreement on volumes to be supplied and delivery schedules are made with the outlet groups.

3.51 Secondly, it calls for .a change in the attitudes and orientation of =the Irrigation Department functionaries in terms of a willingness to take on greater , responsibility for main-system management at a much higher level of quality and simultaneously permit farmers to play a larger role in managing water allocations.

3.52 The change of attitude will not take place spontaneously and without resistance. The existing rules and procedures, having been in vogue for several decades, have a strong inertia. Functionaries are familiar with them; moreover, the discretionary powers of the bureaucracy in water allocation and the attendant opportunities for 'rent seeking behavior' provided by the existing system are powerful reasons for the functionaries to oppose any change which reduces their power and enhances the role of the users in decision- making.

3.53 On the user side also - and this is the third impediment to rapid change - the extent of involvement in managing water allocation has been weak. The traditions of collective management, though fairly strong in respect of local surface systems, is hardly significant in canal systems. Users of canals do act collectively to intercede with the bureaucracy for redressal of specific grievances regarding water supply; but the immediate reaction to any suggestion that farmers' groups should take on a larger institutional responsibility for maintenance and water management is generally not enthusiastic. It will take time and much patient effort to change this situation. Therefore the proposed rationalisation of water pricing will have to be accomplished in a phased manner.

3.54 We recommend that this be done in three phases as explained below.

Phase I : Rationalisation of Crop Based Rates

The objective of the first phase should be to rationalise and simplify the existing system of assessment (based on crop-wise irrigated area on an individual basis) to a system of season-specific area rates reflecting the differences in irrigation requirements of crops between different seasons.

3.55 Typically in most parts of India the irrigation requirements are lowest in Kharif and highest in hot weather; but these requirements vary as between regions, depending on agro-climatic conditions. The differences in irrigation requirements in the major crop seasons can be worked out for different agro-climatic regions taking into account potential evapo-transpiration (PET) , effective rainfall (ER) and non-consumptive uses. The presumption is that areas irrigated in a given season and regions have used, directly or indirectly, canal water equal to the excess of PET and non-consumptive uses over effective rainfall. Allowance for losses from the evaporation involved in carrying over storage from one season to another can be readily incorporated in the calculation.

3.56 Given the total volume of water delivered by a canal system and the average area irrigated by each crop season, it is possible to estimate the relative water consumption per hectare irrigated in different seasons. The variable part of the tariff in the case of major and medium projects and such of those minor works as are still under state management should be fixed on this basis. We would urge that all minor systems be turned over to users immediately after completion. Both categories of projects will pay a flat basic rate per ha. Consistent with our

emphasis that full-cost recovery cannot be sought without, improving the quality of irrigation, and since in any case it is not possible to raise rates to the required level immediately, the level of cost recovery to be aimed at in the first phase should atleast cover the O&M costs and 1 percent interest on capital employed (calculated as above) .

3.57 The above procedure takes into account differences in irrigation requirements among one -season, two -season and perennial crops. Irrigated area under a crop which spreads over two seasons will be charged the rates applicable to both seasons, and perennials for all three seasons. But this cannot take care of differences in water requirements between crops grown within a given season - arising from differences in duration and requirements for non- consumptive uses. The former may be ignored for the sake of simplicity of assessment and leaving farmers more room for flexibility in crop choices. But crops like paddy which take a lot of water for non-consumptive uses need special treatment. Where paddy is the dominant (or negligible) irrigated crop, there may not be much of a problem. Where it is a significant but not dominant crop, some differentiation may have to be made. In each season, therefore, we need to distinguish at best three categories, viz, paddy, sugarcane and perennials, and other crops.

Phase II : Switch to Group - Based Volumetric Assessment

3.58 In the second phase, to be implemented in the course of the next decade; the aim would be to a shift to a fully volumetric assessment system. This will call for additional investments to modify the distribution system for effectively regulating water supply volumes at the outlets. Some valuable experience in this type of improvement is already available in the NWMP which suggests that the investments involved may be Rs. 2500/3000 per ha. This would mean an investment of Rs.5000 crores to cover the entire canal command area in the country, which is modest compared with the Rs. 40000 crores or so allocated for irrigation development in the Eight plan. This will naturally figure in the capital base for determining cost-recovery .In so far as the efficiency of the system, and productivity, improves as a result, the targets of cost-recovery can be progressively increased.

3.59 Along with physical improvements for better main-system management, operational plans regarding the duration of Water supply and its scheduling to different parts of the country will need to be prepared based on a proper study of the relative merits (in terms of equity and productivity) of different patterns of use under different conditions of water supply, and the pattern which is socially most acceptable. By bringing about a more assured and predictable supply of water between seasons (and within seasons) , and leaving to farmers the flexibility to determine how best to use the water, the modifications could add substantially to productivity and may well lead to a saving of water which can be used to extend irrigation to a larger area.

3.60 There are, of course, many important matters of detail to be decided in shifting to the volumetric system of charging. How far should the existing crop patterns and water-use in

different sections of the command be respected/safeguarded in working out volumes and delivery schedules? How far should the existing use (in terms of area irrigated or volume of water used) be protected, especially where localisation/crop pattern restrictions have been violated? These and other related issues are best decided in consultation with user representatives. The resulting allocation of water -reflecting a balancing of socially desirable use of water, and existing patterns of use - provides the basis on which delivery commitments at each outlet can be made to farmers' groups.

3.61 A volumetric system of assessment cannot be implemented if the managers are required to monitor deliveries and bill individual farmers. The system should take responsibility only for bulk deliveries to relatively large groups of farmers. In this manner the burden on the system managers and therefore the costs to the government can be reduced substantially; conditions are also created thereby for the creation of farmers' groups for water management and for their participation in running the system. The most crucial, and also the most difficult, task in this phase will be to promote the formation of sufficiently large farmers' groups and nurture their capacity to take over maintenance and water management below the delivery point as well as to collect water charges from its members. This aspect is discussed at greater length in chapter 6.

Phase III: System Improvement

3.62 Phase III which will naturally be spread over a much longer period should seek to extend and consolidate the system of farmer - group management, and implement with the involvement and participation of such groups a programme for upgrading the system to a higher level of efficiency in water use and therefore productivity. At the technical /management level, improving the productivity of surface systems requires several measures: (a) making the systems capable of guaranteed delivery of a specified quantum of water to a definite duration and schedule at the chosen point; (b) raising overall irrigation efficiency (i.e.; the proportion of water tapped at the reservoir which effectively becomes available to the roots of the crops) ; and (c) the adoption of sophisticated techniques to coordinate the use of surface and ground water in a flexible way, depending on both supply and demand conditions, to get optimum production from the available water and the complementary resources needed to harness it. Besides substantial investments in conjunctive use and distribution networks, the techniques of water management will have to become tighter and more sophisticated.

CHAPTER - 4

OPERATION AND MAINTENANCE

Introductory

4.1 Operation and maintenance (O&M) expenditure constitutes one of the principal elements of the recurring costs of irrigation systems, the others being depreciation and interest on capital employed. The physical facilities which make up an irrigation system are subject in the normal course to wear and damage owing to a variety of factors. They need to be maintained and attended to regularly if the system is to work according to design.

4.2 Public irrigation systems in India are largely maintained and managed by the Government; but there are cases in which the users share a considerable part of the responsibility. Most major and medium irrigation projects belong to the former category: for the State Irrigation/Public Works Department is responsible for maintaining facilities and regulating water supply upto outlets which command 5-40 hectares. There are, however, instances (for instance, Tamraparni and the Palar systems of Tamil Nadu) Where the users even in major systems play a substantial role in both maintenance and water allocation at the local level. In most minor irrigation works, the government's responsibility is limited to the main storage/diversion structure, the rest of it being managed by users.

4.3 The allocations for O&M for the Irrigation or Public Works Department as a whole are determined as part of the State budget; the releases for different administrative units of the department-usually a mix of territorial units and projects - is decided by the head of the department. It is generally recognised that the funds allotted for O&K are inadequate and that the allocations for particular projects often do not meet their needs in terms of either magnitude or timeliness.

Need to Improve Accounting of O & M

4.4 The amount actually spent on O&M on a conceptually clear and uniform basis cannot be readily determined from published budgets or accounts. The working expenses include several items other than salaries and maintenance/ repairs (accounting for 28 percent of the total in 1984-86) . The salaries of the regular departmental establishment are not always included; and some States include costs of assessment and collection while others do not. Projectwise estimates also suffer from, these problems and their coverage and comparability are even more in question. Subject to these limitations, we note that the average working expenses per hectare of GIA in 1984-86 averaged Rs. 150 ; excluding "other expenses" the figure is around Rs. 110 . The working expenses (WE) /ha ranges from as little as Rs.36, in Kerala to Rs. 380 in Gujarat. The figures compiled by the Committee on O&M of Irrigation Projects (CWC May, 1988) also show large inter-State variations, but the levels are different. Compilations from the NWMP

projects and other projects (summarised at Tables 4-1 and 4-2 respectively, with statewise & projectwise details at Annexure-4.1) again are different.

The necessity to improve the accounting of expenditures needs hardly any emphasis.

Table 4-1: N.W.M.P SUB-PROJECTS

Statewise operation and Maintenance Costs (O&M cost) per hectare of Irrigated Area/per Th. M³ of water Used.

S. No.	State	No. of NWMP sub-project considered	Weighted avg. O&M Cost/per ha .in Rs.	Weighted Avg. O&M Cost per Th.M ³ of water use in Rs.
1.	Andhra Pradesh	10	76	8
2.	Bihar	2	29	5
3.	Karnataka	20	146	12
4.	Kerala	6	74	8
5.	Madhya Pradesh	19	150	19
6.	Orissa	7	91	11
7.	Tamil Nadu	6	81	6
8.	Uttar Pradesh	2	175	16

Source: Sub-project reports received under National Water Management Project (NWMP) in Ministry of Water Resources, New Delhi. See Annexure-4.1 for details.

Figures relates to the period between 1985-86 and 1990-91.

Note: Differences in the figures in respect of some states which figure in the two tables may be due to differences in concept of O&M expenditure and period covered.

Table 4-2: Major 4 Medium Projects (Other than MWMP)

Statewise operation and Maintenance(O*M)
Costs per hectare of Irrigated Area/per Th. M³ of water used.

S. No.	State	No. of NWMP Sub-project considered	Weighted avg. O&M Cost/per ha.in Rs.	Weighted avg. O&M Cost/per Th.M ³ of water use in Rs.
1	Andhra Pradesh	5	164	13
2	Haryana	2	146	27
3	Karnataka	1	160	17
4	Maharashtra	9	226	24
5	Orissa	4	113	14
6	Rajasthan	13	72	10
7	Uttar Pradesh	14	189	23
8	West Bengal	3	241	48

Sources: Data received from the State Governments for Pricing Committee in response to letter from the Planning Commission, March, 1992.

Figures relate to the period between 1986-87 and 1990-91.

Eventual Goal: Self-Financing System

4.5 The general principle in government accounting is that all receipts are credited to a common pool known as the Consolidated Fund, and all expenses are incurred out of appropriations separately made from that Consolidated Fund on the authority of grants voted by the Legislature. Each Department is not authorised to retain its receipts to meet its own expenditure. However, this applies to general governmental functions; when it comes to the provision of a particular supply or service to a particular group of Consumers, there is a case for linking receipts and expenditure. In fact, when such a function is entrusted to a separate autonomous body (for instance, State Electricity Boards) this linking is automatic; the receipts are not government revenues but are the commercial receipts of the body in question, which finances its expenditure out of these receipts, the shortfall, if any being met by a government subsidy. We have already argued that the provision of irrigation water is a specific facility to a particular group of users, and that the concept of user charges is applicable here. It follows that there is a case for earmarking the whole or a substantial part of the receipts from each irrigation system towards the operation and maintenance of that system. For the present, this would be inadequate and may have to be supplemented by a provision from general government revenues. In the long run, there is a case for moving towards the conversion of each irrigation system into

an independent self-financing system, whether through the formation of corporations or otherwise.

Inadequacy of Allocation for O&M

Meanwhile, under the existing arrangements, there is clear evidence both in the aggregate and in the case of some specific projects that the amount spent on direction and establishment increased much faster than the outlay on maintenance and repair (even counting outlays on extension and improvement as part of maintenance). The wage and salary component of M & R expenditure has also risen steeply on account of the build-up of surplus staff inherited from the construction stage and periodic salary revision. The Eighth Plan working group on irrigation, noting that O&N is an item of non-plan expenditure, observed: "due to shortages of funds and restrictions on increases in non-plan activity, sufficient provisions are not being made under this head and most of the allotted money is being spent on staff payments" This has cut into the amounts available for physical works resulting in a deterioration in the condition of the structures and distribution networks. In an attempt to remedy the cumulative effect of this neglect, the State Irrigation Departments have sought to rely on plan schemes for rehabilitation and modernisation. The working group observes: "Most of the schemes, presently coming under the garb of modernisation for taking up under the plan are actually meant to attend to these accumulated repair and maintenance works".

4.7 Of late the inadequacy of OSM provisions has attracted considerable attention. The Finance Commissions sought to make adequate provisions for OSM and for improving cost recovery in the projection of non-plan revenue gaps. In doing so, they took the advice of the Union Ministry of Irrigation regarding the 'norms' which may be considered reasonable. In its submission to the Eighth Finance Commission, the Ministry suggested a norm per hectare of utilised potential which included expenditures on regular establishment supporting the project staff; provision for maintenance of headworks; distribution system; and drainage. It further suggested that provision be made for maintenance works in respect of unutilised potential and also for special repairs. This approach was reiterated by a special committee appointed by the CWC in 1988. The Ninth Finance Commission, however, accepted a lower norm, emphasising the necessity to have a mechanism to make sure that actual allocations conformed to the norms. Unfortunately, however, this has not been done and the general complaint is that amounts provided and released for O&M of irrigation projects continue to be well short of norms.

Need to Transfer Some Functions to Users.

4.8 If the budgetary allocations for the operation and maintenance of irrigation systems are inadequate, this is not merely because of the mounting burden of staff costs but also because of the excessive involvement of the government in functions, which are best left to the users. At an earlier stage, faced with the problem of very low utilisation of the irrigation potential created by

major, projects, the government evolved the Command Area Development approach which meant not merely extension and promotion but also the construction of field channels and drains, and the undertaking of on-farm development works, such as land levelling and shaping, by the government. The scope of projects was also extended so as to take the water upto 5 to 8 ha. outlets (from 40 ha. outlets as was; the earlier practice). Subsequently, an integrated approach to project formulation was also recommended, which sought to absorb CAD into the main project itself. Recent evaluations seem to warrant some scepticism regarding the effectiveness of the CAD approach. Without entering into that debate, it is possible to say that the Irrigation Department has got over-extended and cannot possibly do full justice to all its functions. There is a strong case for the Department divesting itself of the responsibility for the maintenance of the network below a certain level of outlet (say a 100 ha outlet) and transferring this responsibility to users' groups. This would not merely reduce costs but would also enable the Department to concentrate on the maintenance of the main system and perform that function better. The question of promoting farmers' participation is discussed in greater detail in Chapter 6.

Expert Groups to Work out Norms

4.9 The prescription of a uniform norm of O&M expenditure also calls for a review: The Eighth Plan working group had observed:

"The present system of fixing flat rates per hectare of irrigated area for operation and maintenance without taking into consideration the nature and type of project is not rational. For example *the* present system does not permit any differentiation between diversion works and storage works. Requirements of maintenance on earthen /rockfill dams and concrete or masonry dams cannot be the same. in the case of dams, regular surveillance and follow up action for safety of dam is also necessary". Again: "Maintenance charges of irrigation systems below headworks cannot be uniform throughout the country as this will vary from place to place depending on peculiarities of topographical and meteorological conditions."

The working group went on to recommend that norms for operation and routine maintenance be fixed by each State depending on climatological and other factors; and special repairs (including major repairs, replacement of structures and those works which should have been done as part of normal maintenance but were not) be provided for in the plan along with a special programme for dam safety measures.

4.10 We endorse this approach and recommend that States set up special expert groups to work out appropriate norms, and a procedure for periodic monitoring and updating, for different agroclimatic regions and broad categories of projects. At the same time, the need to economise

O&M costs, by improving the efficiency of the planning and execution of works and/or getting beneficiaries to take over a part of the responsibility, has to be recognised and pursued seriously.

Funds for Deferred Maintenance/Special Repairs

4.11 Before embarking on any programme for proper O&H of a project, it is necessary to ensure that the project is capable of delivering water as intended. In some cases, the system may have deteriorated and become incapable of such delivery. In some other cases, the original design may itself be inadequate to meet the present operational criteria and therefore the project may be incapable of providing satisfactory service. In all such cases, it is necessary to bring the project to the desired standard. This, in some cases, would involve considerable cost.

4.12 In particular, if we wish to switch to group-based delivery, it will be necessary to clear the backlog of deferred maintenance and to upgrade the main system. We therefore recommend that (a) at least 10 per cent of the plan provision for major and medium projects be allocated for renovating and upgrading existing systems to facilitate the introduction of group-based volumetric assessment and (b) the recovery of accumulated arrears - the magnitude of which is currently very large - be earmarked towards meeting the cost of deferred maintenance/special repair works in the project concerned. A public commitment to this effect may also encourage farmers to clear the arrears.

Maintenance: Components and Categories

4.13 Even after such restoration work is carried out, it is essential to maintain all the project components properly, so that the project would continue to be of satisfactory service. Reference may be made to Annexure-4.2 for a component wise description of maintenance needs.

Maintenance can be broadly classified into three categories:

1. preventive maintenance
2. operative maintenance
3. special repairs and disaster maintenance

The requirements of preventive maintenance for different components of the irrigation system are different. These operations can be systematically itemised and can be estimated with a fair degree of accuracy at the beginning of a fiscal year. The operative maintenance consists of surveillance and repairing the damages or defects noticed. There are innumerable defects which can arise in the system spread over a vast stretch of land. The more common among them are listed in Annexure-4.2.

4.15 The third and the most critical item of maintenance is the one relating to distress caused by more serious failures. These are really accidents which do occur once in a while in spite of the best of efforts on part of the maintenance staff. However, with timely and systematic preventive and operative maintenance, the frequency of such damages would become considerably less, and the extent of damage would also get minimised. The rectification of damages caused by such disasters naturally takes the form of the execution of works of a capital nature. Such expenditures are generally classified as special repairs, to distinguish them from the ordinary repairs of the type undertaken under preventive and operative maintenance. Budgetary provisions for such expenditure can be made in accordance with the disaster management policy of the States.

Norm - Based Allocations for Maintenance

4.16 As regards the budgetary provision for maintenance, existing practices in the country vary considerably. Some States prefer to have maintenance grants on an area (per ha) basis, while others prefer a percentage of construction cost. Some have separate norms for head works, canals etc.

The Committee deliberated on various approaches and is of the view that there should be separate norms for (a) head works; (b) main canal (s) and branches; (c) distribution network comprising distributaries, and sub-minors and drainage- (d) communication networks; and (e) buildings. This is because these components have different characteristics and it is logical that separate norms should be prescribed.

4.17 The Committee commends the methodology adopted in working out O&M norms for projects in Uttar Pradesh and for Jayakwadi Project in Maharashtra (Annexures-4. 3 and 4.4 respectively). It has the merit of detailing different components of works and defining the maintenance norm in terms of the nature and physical quantum of the work involved. This permits the financial costs to be estimated taking into account actual conditions and also changes in prices over time. A simpler alternative, but one which is distinctly inferior would be to assume certain financial norms as a percentage of the cost of various components ¹. To be meaningful this norm should be prescribed on the basis of the present day cost of construction as it would otherwise not at all be relevant for the projects constructed ten or twenty years ago or even earlier.

4.18 It would be appropriate that, based on these general recommendations, the States should work out the norms for the head works, canals and the distribution system. Based on these norms, the per hectare norm for maintenance can, be worked out, and this would be an input in

1 This approach has been adopted by the M. G. Shah Committee in Gujarat (1985). Relevant extracts from this report are given in Annexure 4.5.

determining the costs to be recovered and the rates. This should be a region-wise exercise, distinguishing different categories of projects. In exceptional cases, for mega projects, it may even be possible to have project-specific norms both for fund allocation and recovery.

4.19 At the State level, the budgetary provision for the Department should be on this over-all per ha basis, whereas allocations will be made to individual projects based on the components of maintenance costs for head works, canals and distribution networks. As in the case of operation, it is expected that maintenance below the point of group delivery will be carried out by the beneficiaries, and no separate maintenance grants are necessary for this purpose.

Reducing Staff Costs

4.20 As regards staff, most States have manning norms for various categories of personnel involved in managing and operating irrigation systems. But actual manning levels and patterns can and do differ from the norms for a variety of reasons.

4.21 The staff component has been increasing over the years leaving progressively less funds for physical maintenance. The proliferation of personnel has occurred on account of various causes (such as liberal norms of staffing, obligation to provide permanent employment to workers from the construction stage, political influence and intervention from courts) .Further, increases in staff costs also result from the rapid rise in wages and emoluments. The combined effect is that in the country as a whole, the staff component has risen from 34 per cent in 1974-75 to 43per cent in 1986-87¹¹; it is mounting from year to year. This cannot be afforded. Deliberate efforts are called for to bring down the staff costs substantially.

4.22 As a first step, the strength needs to be frozen and progressively redeployed on new commands, or alternative avenues found for placement. The total wage bill in government is known to be substantially higher than in the private and the cooperative sectors. One of the effective ways of cutting the cost is to transfer the functions to users' groups who would be able to operate with relatively low overheads. This is a strong argument in favour of establishing users' groups and lessening the burden of O&M on users. There is also the possibility of saving by allotting maintenance and repair works on contract to users' groups. The complete package of measures for the transfer of functions to users' groups need to be developed and offered. This should be acceptable both socially and politically.

1 Source: Financial Aspect so Irrigation and Multipurpose Fiver Projects (FT-125), CWC-May, 1990.

A detailed study of three Gujarat Projects by the Subha Rao Study Group (1988) showed that staff costs accounted for as much as 60 per cent of total O&M expenditure in 1986-87.if the full complement of staff as per norms had been in position, this proportion would have been higher, say 70 per cent.

4.23 While the transfer of responsibility for O&M to users will limit the government's liability for O&M below the point of group delivery, the adoption of lower water rates for group delivery than for individual delivery would provide an inducement for people to come together for forming users' groups and taking over O&M functions. (This is discussed further in Chapter 6).

There is also the issue of how the general overheads of the supervisory and headquarters establishment of the PWD/Irrigation Department are charged in working out the costs of irrigation. These questions will assume much greater importance when irrigation pricing is explicitly sought to be based on the principle of cost recovery.

Study of Staffing Norms

4.25 In this context it will be useful if the Central Water Commission could undertake a systematic comparative study of the existing norms and the actual situation on the ground in all the major States. Such a study should lead to the evolution of rational and uniform practices in defining both the norms and the basis for the staff costs which farmers can be legitimately expected to bear. As in the case of maintenance, an analysis of staff costs for different functions and at different tiers of the system would be valuable. It will help quantify the potential reduction in government costs which would result from the formation of farmers' groups.

Irrigation Water Pricing Board

4.26 A periodical review of O&M charges and water rates is necessary. The Committee is of the view that States should form a high-powered autonomous board (which may be called "Irrigation Water Pricing Board") to review the policy, establish the norms regarding maintenance costs for various components and staff costs, assess the actual expenditures in relation to these norms, and determine the parameters and criteria for revising water rates. There should be a mandatory review of all these matters every five years with an opportunity for users to present their views.

CHAPTER - 5

ASSESSMENT AND COLLECTION

Weaknesses in Existing Mechanisms

5.1 We have earlier underlined the need to restructure water rates so as to make irrigation projects more self-sustained and promote the efficient use of water. We, feel however, that a rationalised price-structure by itself is not sufficient. The revision of water rates without strengthening the assessment and collection mechanism will serve little purpose. The slackness in assessment and collection of irrigation revenues is reflected in the wide gap between demands raised and actual collections in most States. It is therefore, pertinent to investigate and analyse the weaknesses of the existing mechanisms of assessment and collection of revenues prevalent in different States and suggest remedial measures.

5.2 Assessment is usually done on the basis of the area irrigated. There are of course instances as in Orissa where compulsory water rates are levied during kharif on all fields which lie in the irrigation command area of the project whether water is actually used by the farmer or not. A compulsory water rate system saves a lot of the effort involved in the inspection and assessment of irrigated area and raising demands.

5.3 There are arrangements for levying penalties for the unauthorised use of irrigated water. In case of non-payment of water rates in the scheduled time, there is a provision for levying interest on arrears. In some cases, water supply may even be stopped unless arrears are cleared.

5.4 Detailed provisions exist for the remission of water dues if irrigation water is not made available in accordance with prior sanction or if damage occurs to the crop under irrigation because of natural calamities such as drought, flood, hailstorm, diseases etc.

5.5 Among the various problems faced in the matter of assessment, unauthorised irrigation and incorrect reporting of crops and irrigated area are the major ones. Owing to procedural difficulties, there are also delays in raising demands. Generally the assessed amount is intimated to the irrigator and his objection, if any, is entertained. The final assessment is done after taking into account the objections of the irrigator. There is also a provision for appeal against the final assessment.

5.6 In spite of low and subsidised water rates, actual revenue recoveries are substantially below the demands. It will be seen from Annexure - 5.1 that except in U.P., Haryana and Punjab, the actual collection of the assessed amount in the States reported upon varied from 27% to 70% in 1990-91. Large arrears have been allowed to accumulate and these tend to be

eventually written off. Even better administered States are reporting the collector - demand ratio at 70%. Several factors contribute to this.

5.7 Irrigation water is available on credit for all, while cash payments are to be made for all other farm inputs in most cases. Farmers may be tempted to use the money elsewhere rather than pay for irrigation charges. The expectation that dues will be eventually waived by the government also encourages default, specially when there is in practice no differential treatment to the irrigators who pay regularly in comparison with the irrigators who never pay.

5.8 Land records are not up-dated from time to time. This makes it difficult to recover the amount in a number of cases. The existing mechanisms for preventing unauthorised, excessive and wasteful use of water as well as for the recovery of outstanding dues have not proved very effective. Lack of coordination between different agencies involved in assessment and collection also aggravates the problem.

Roles of Irrigation and Revenue Departments : Diverse Arrangements.

5.9 There is considerable diversity in the mechanism for the assessment and collection of irrigation revenues. At one extreme are the old irrigation works of Andhra Pradesh, Tamil Nadu and parts of Karnataka whose ayacut-dars are not required to pay a separate irrigation fee, as it is merged in the land revenue. Where separate water charges are levied, and this is the more common feature (see Table 5-1), the responsibility for both assessment and collection vests in some cases (e.g., Bihar, Madhya Pradesh, Maharashtra, two large systems in Gujarat and Rajasthan) in the Irrigation/Water Resources Department; in others (Haryana, Punjab, U.P., West Bengal) the assessment is done by the Irrigation Department, collection being the responsibility of the Revenue Department; and in yet others (Karnataka, Andhra Pradesh, Kerala, Orissa and Tamil Nadu) the Revenue Department is responsible for both functions.

Table 5-1

Demand, Collection and Accumulated Arrears of Water Rates in Major States

(Rs. in Million)

State	Responsibility for Assessment & Collection	Period	Demand	Collections	Accumulated arrears
Andhra Pradesh	Both by Revenue Department	1986-87	N.A.	N.A.	N.A.
Bihar	Both with Irrigation Department	1986-87 to 1990-91	98.7	55.2	388.2
Gujarat	“ “	1986-87 to	10.2.5	73.9	385.6

State	Responsibility for Assessment & Collection	Period	Demand	Collections	Accumulated arrears
		1990-91			
Haryana	Assessment by Irrigation Deptt. and collection by Revenue Department.	1986-87 to 1990-91	112.6	113.8	103.4
Karnataka	Both by Revenue Deptt.	1979-80 to 1981-82	6.5	5.9	15.0
Kerala	Both by Revenue Deptt.	1979-80 to 1985-86	8.0	N.A	6.8
Maharashtra	Both by Irrigation Deptt. since 1976	1986-87 to 1990-91	191.5	145.0	791.0
Madhya Pradesh	Both by Irrigation Deptt.	1986-87 to 1989-90	234.0	144.5	806.5
Orissa	Both by Revenue Deptt.	1986-87 to 1990-91	93.6	41.0	N.A
Punjab	Assessment by Irrigation and collection by Revenue	1986-87 to 1990-91	99.1	104.4	Nil
Tamil Nadu	Both by Revenue Deptt.	1985-86 to 1989-90	33.9	N.A.	N.A
Uttar Pradesh	Assessment by Irrigation and collection by Revenue Deptt.	1986-87 to 1990-91	617.2	576.4	582.7
West Bengal	Assessment by Irrigation and collection; by Revenue Deptt.	1986-87 to 1990-91	23.7	7.5	N.A

Source : Information furnished by the reporting States.

- Note:
1. Figures for 1979-80 to 1981-82 relating to Karnataka and Kerala from GOI, CWC "Water Rates for Surface Water in India-1988". Data for Karnataka relates to Tungabhadra, Tungabhadra LBC and three small lift irrigation schemes. In other cases they relate to all major and medium irrigation schemes.
 2. Demand and collection are the average per annum during the specified period. Accumulated arrears as at the end of the specified period.

5.10 Wherever the -Irrigation Department bears the entire responsibility, it has its own separate establishment at village level for recording and verification of the area under different

crops actually irrigated on each plot under the command, determining the amount payable by each farmer and collecting the amounts due. The argument for this arrangement is that the Irrigation Department functionaries are in a better position to know the actual status of irrigation at the field level and that the Irrigation Department has a greater direct interest in collecting the dues. The data in table 5-1 and discussions during the field visits do not quite bear out this assumption.

5.11 The Irrigation Department has in any case to rely on local revenue officials for a variety of detailed information on farmers and individual plots needed for assessing water charges. Also, in so far as Irrigation Department functionaries are not empowered under the law to recover Irrigation dues as arrears of land revenue, and this seems to be the rule, the efficacy of collections depends critically on the cooperation of the Revenue Department. Further, the mere fact that the Irrigation Department has its own field establishment does not mean that the opportunities and incentives for -under-assessment are in any way reduced; the local officials of the Irrigation Department like their Revenue Department counterparts are subject to a variety of pressures - not only locally but from outside - both in the matter of assessment and levy of penalties for illegal use and even more in the matter of enforcing collections. At any rate assessment and collection or even assessment alone by the Irrigation Department involves extra costs.

5.12 The arguments made against handing over the assessment functions wholly to the Revenue Department is that with the decline in the importance of land revenue, the process of inspection and verification of the records of land use, cropping and irrigation have weakened. The fact that a large number of other functions (related to development) have been entrusted to the Revenue officials has also contributed to this. Further, even in the best of times, the revenue establishment was as prone to pressure and inducement for under-assessment as the Irrigation Department. The advantage of the greater local knowledge possessed by village officials has been weakened in several states by the dismantling of the traditional system in favour of a transferable cadre of Karnams and Patwaris.

5.13 The third arrangement, where the Irrigation Department makes the assessment and collections are made by the Revenue Department, is favoured by irrigation officials in some States. The limited data we have (see Table 5-1) suggests that the ratio of accumulated arrears to annual demand is generally much higher in States where the irrigation Department is responsible for both assessment and collection than where both functions are vested in the Revenue Department or where they are divided between the Irrigation and Revenue Departments. This ratio exceeds 3.0 in all the 4 states falling under the first category; exceeds 1.0 in 1 out of 5 States in the second category and is below 1.0 in 3 out of 4 States falling in the third category.

In the normal course an agency which provides the service will also collect the payments from the users of that service. This will happen in the case of irrigation water also when each

irrigation system eventually becomes an independent self-financing entity as envisaged in this Report. However, so long as the irrigation service is provided by the government, the question of the relative roles of the Revenue and Irrigation Departments in the realisation of irrigation charges will remain relevant.

5.15 Having considered the matter, the Committee is of the view that the assessment function is best entrusted to the Irrigation Department. As for collections, the Committee noted that there are good arguments both for vesting this function in the Revenue Department and for making the Irrigation Department responsible. The balance of advantage cannot be clearly established with the available evidence. The Committee, therefore, recommends that States may choose one of two options -- (1) entrusting both assessment and collection to the Irrigation Department, and (2) making the Irrigation Department responsible for assessment and the Revenue Department for collections - in the light of their specific circumstances and experience. Where alternative (1) is preferred, it would be necessary to empower the Irrigation Department officials to recover arrears of irrigation dues under the Revenue Recovery laws.

Under - assessment : Remedies

5.16 We have already noted that collections are well below demands and that the accumulation of arrears is large. There is also reason to believe that the demands may themselves be less than what is chargeable at existing rates. The Committee would like to emphasise the need for purposive and strong measures to ensure the accurate assessment of irrigation charges and their prompt and full collection.

5.17 There is obviously room for the farmers to reduce, if not escape, the payment of water charges by understating the extent of area irrigated in, each season; this tendency may be expected to be greater in the dry months (especially the summer) when the season - ha. rates will be relatively high, and the village level functionaries may be induced or pressurised into under-recording the area irrigated. In order to check this tendency, we suggest that a regular system of independent verification of actual irrigation on a sample basis be introduced on all major and medium project commands.

5.18 At the same time, the possibilities of using remote sensing to get an objective estimate of the extent of irrigated area in different seasons for each system should be seriously explored. The technology of remote sensing currently available is capable of assessing the extent of irrigated cropping even in parts of the command. The technology - both of imagery and of its interpretation - is improving rapidly. Therefore we can look forward to further refinements in terms of detail and accuracy. The NRSA* and other agencies have attempted to use remote

* National Remote Sensing Agency, Hyderabad.

sensing to ascertain land-use, cropping intensity and irrigation in few selected regions. But it has not been possible for us - partly for lack of time - to get a critical evaluation of the results in terms of their accuracy and cost. Given the potential of this technique, we strongly recommend that a serious effort be made by Irrigation Departments to use remote sensing not only for monitoring the extent and quality of irrigation in selected commands (as is being attempted in some NWMP ** Projects) , but also as an independent source of information on irrigated area which can be used along with sample verification to test the veracity of records maintained by field staff. Such independent checks linked to a system of penalties for inaccurate (and rewards for accurate) recording would greatly help to minimise the loss of revenue from under assessment.

Remissions

Almost all States provide for remissions of water rates when the yield falls, below a certain percentage of normal, the extent of remission being related to the extent of shortfall in yields (CWC 1988, 24-25). Given obvious problems in establishing a liable procedure for determining the extent of yield shortfall in particular localities and the growing tendency to use such remissions for political reasons, there has been increasing laxity in interpreting the criteria. This is a matter for concern, but we were unable to get full information on the extent of remissions granted or their trends. However, we are of the view that the practice of waiving or suspending collections of irrigation charges on account of drought is not justified in respect of areas actually irrigated.

Improving Collections

5.20 Apart from normal water rates several States have enacted laws for the collection of betterment levies from farmers benefitting from public irrigation works, and most States have regulations to penalise violations of authorised localisation of crops or of crop patterns, illegal tapping of canal water and construction of wells within certain distances from canals. However, the enforcement of these regulations in terms of both raising demands on the farmers concerned and collecting the dues has become extremely lax.

5.21 Attempts to collect betterment levies and impose penalties for violations of irrigation rules have been progressively weakened on account of resistance from affected farmers. The number of farmers affected being quite sizeable, they have been able to exert effective political pressure to avoid the payment of demands which were raised in the earlier phases. The reluctance of the governments to support the agencies concerned in enforcing the regulations has led to a situation in which these agencies have practically given up even raising demands for betterment levies; very little is done to take cognizance of the widespread violations of rules and

** National Water Management Project assisted by World Bank.

even less to enforce what little penalties are levied. He need hardly emphasise that such laxity has serious consequences not just in terms of revenue but for the efficient management of the systems.

5.22 We would also recommend that with a view to improving collections, the states should consider switching from the existing system of supplying water on credit to one of supply against advance payment. Gujarat provides 10 percent rebate to cultivators who pay in advance. Users are likely to have a greater interest in paying their dues if the proceeds are seen to be applied for the benefit of their system and to make a significant difference to its quality. While departmental and, even more so, systemwise earmarking of receipts to meet their respective expenditures is not possible under existing financial rules, we recommend that the collection performance relative to demand should be an important consideration for deciding the allocation of O&M funds to individual systems. We also recommend that proceeds from the collection of accumulated arrears from a system be used for making up the cumulative effects of past neglect in the maintenance of that system.

Reducing Cost of Collections

5.23 The most effective way to minimise costs of assessment and collection would be a system of group assessment on a volumetric basis. In that case, there is no need to record or verify cropwise area irrigated for each plot; all that the Department needs to do is to measure volumes delivered at distributary/minor/outlets which are far fewer than the number of beneficiary farmers, leaving each group to work "out and enforce assessments on their members individually. But until such a system is introduced, the state agencies will need to verify and record the area irrigated by plots in order to determine the dues from individual farmers.

5.24 The proposed system of season-hectare assessment (i.e., assessment on the basis of area irrigated in each season) will substantially simplify the task. This system would obviate the necessity to record the area irrigated by individual crops; all that needs to be recorded is whether or not a particular plot belonging to a particular farmer received irrigation in each season. In respect of major and medium projects, the season-ha rate establishes a better correlation between the volume of irrigation needs and rates. In the case of minor surface works, since assessment will be at a flat rate per hectare of command, there is no need for recording crop-wise area irrigated for the assessment of water rates.

5.25 As the scheduling of water becomes firmer and more predictable on the basis of improved operational plans for each system, elaborate regulation on crop patterns can dispensed with. There will then be no need for elaborate monitoring of crop pattern violations. In fact, farmers will have greater freedom to choose the crops they want to grow within the limits set by the quantum and duration of supplies from the irrigation system.

5.26 The aim should be to increase user participation in management initially at the level of distributaries and minors, and in due course at the level of the system as a whole. Each system should become an autonomous entity which manages its own finances both for operation and eventually for the expansion/ improvement of facilities, when each system is clearly responsible' for meeting the costs of running it, there would be a stronger incentive for recovering costs from user and for paying greater attention to cost control, and, the scope for external interference being reduced, an environment conducive to greater discipline in the management.

CHAPTER - 6

ROLE OF FARMERS' GROUPS

Background

6.1 We have emphasised the necessity for major changes in the way irrigation systems are managed if irrigation pricing is to be rationalised and made more cost-effective. The effective involvement of farmers in management is essential for improving the operational efficiency and financial viability of public irrigation systems. The country must move over progressively from management wholly through the government bureaucracy to a management by user farmers. As a first step, we suggest a substantial reduction in the sphere of responsibility of the government and the encouragement of user groups to take over maintenance, management of water allocations, and collection of water rates for a group of outlets serving at least a village.

6.2 The concept of user involvement in irrigation management is not new in India. Traditionally, small, local systems in several parts of the country were constructed and have been managed by village communities. These institutions of community management are widely believed to have been weakened by the propensity, both during British rule and in the post-Independence period, for the government to take over more and more of these responsibilities. Nevertheless even today there are innumerable instances of user-managed local irrigation works functioning effectively in various parts of the country. These include, for example, a large number of tanks all over south India, the PHAD system in Nasik and Dhulia districts of Maharashtra and the Vijaynagar channels in Karnataka.

6.3 But the picture in respect of large surface systems is strikingly different. Almost all of them have been constructed in the present century or so by the government and managed wholly by functionaries of the Public Works or Irrigation Departments. The only significant instance of user involvement in water management is the Warabandi system prevailing in Punjab, Haryana and West UP. But its scope is limited.

6.4 Experience has made the government recognise the necessity for wider involvement and participation for effective management. Encouragement of users' participation is now an accepted part of national policy. The National Water Policy (1987) states: "Efforts should be made to involve farmers progressively in various aspects of management of irrigation systems, particularly in water distribution and collection of water rates". We found that State-level officials with long experience in managing irrigation not only recognize the validity of this approach in principle but are also interested in taking effective action to implement it.

Efforts so far

6.5 The past two decades have witnessed the enactment of legislation, for this purpose and also numerous initiatives, partly by government and partly by voluntary organisations, to foster

Water Users' Associations in the command of major and medium projects. The Ministry of Water Resources had requested all the State Governments in 1985 to take up the scheme of farmers' participation on a pilot basis in at least one minor comprising about 1000-2000 ha. of area in each Command Area Development (CAO) project for initiating the process of farmers' involvement in water management and maintenance of field channels. Detailed guidelines were also issued by the Ministry in April 1987 to all the States in the matter (see Annexure - 6.1). Under the Centrally sponsored CAD schemes, a management subsidy, at Rs.100 per ha. for the first two years and Rs.75 per ha. for the third year for farmers' associations formed for taking over the management of water distribution below the minor level, was given during the Seventh Plan. A number of water users' associations/ societies; are reported to have been formed at minor/outlet level in different States (Annexure - 6.2).

6.6 The provisions in various state enactments regarding farmers' participation in irrigation management are summarised in Annexure - 6.3. Some States (e.g., Kerala) provide for user involvement not only at the outlets but also at the intermediate levels and the project as a whole. Others (e.g., AP, Maharashtra, UP and MP) provide for farmers' management beyond the outlets. However, the relevant laws of several states (e.g., Punjab, Haryana, West Bengal, Rajasthan and Assam) do not have any provision for constituting users' associations and involving them in management. Even where provisions exist, there is a tendency to make the associations subject to active control by the Department.

6.7 Efforts to actually organise farmers' groups and make them participate in management have been patchy and can claim only a limited success so far. Most State Governments have not really pursued the idea seriously. Maharashtra and Gujarat are the two States where considerable pioneering activity has taken place in this sphere. Apart from several examples of voluntary efforts to establish users' cooperatives - for instance, the Mohini Cooperative in Ukai, Kakrapar and the Sri Datta Cooperative in Mula are famous - the Gujarat and Maharashtra governments have also adopted an active policy of promoting farmers' involvement in irrigation management.

6.8 Gujarat visualises constituting, in each project, committees with user - representatives at the village, the branch canal and the project levels. By 1988, the idea is reported to have been implemented or to be under implementation in 24 projects. The State has also a programme for encouraging the formation of water - users' cooperatives. The Sardar Sarovar project goes further and envisages that the project management 'will deliver water at the village outlet, leaving the subsequent management entirely to users. Maharashtra has recently announced a policy of progressively shifting to a similar system. (Annexure 6.4)

In some other States, (e.g., Tamil Nadu, Andhra Pradesh) similar initiatives have been reported at the level of particular projects. "Pipe Committees" were organised to manage water distribution below the outlet level in the Sriram Sagar project of Andhra Pradesh. But these are now reported to have become inactive. In Tamil Nadu irrigation community organisers trained

in water management were used to motivate and organise farmers for group action in the lower Bhavani project. So far about 25 percent of the project is reported to be covered by a four-tier structure of farmers' associations. Also noteworthy in this context is the West Bengal programme of transferring the entire operation and maintenance of a large number of tubewell clusters (involving some 7000 wells to date) through the Panchayat Sanities to users' groups. (Annexure - 6.5).

6.10 While no systematic assessment of these efforts is available, it is known that the area covered by these initiatives is very small, less than 1 percent of area irrigated at present. The general consensus among knowledgeable people is that they have been fitful and have not really made much of an impact. For the most part, the outlet and canal committees are there only in name; their functions are vague; they seldom meet; they are not consulted on substantial issues; nor are department officers required to follow their advice. There is also considerable reluctance, if not opposition, from the operational staff of the Irrigation Department to involving users in management; and even the users themselves tend to be apathetic to the idea.

6.11 Initiatives for group formation will be forthcoming from users only if they see a reasonable prospect of substantial gain and if circumstances create the compulsion for cooperation. Steps for accelerating the process of forming effective users' groups has therefore to be conceived in a wider framework combining better management of the system as a whole with incentives for group operation.

System- Improvement Precondition

6.12 An essential precondition is to convince users that they will benefit from such group activity by getting more water, more assured supplies according to a pre-specified schedule (or according to the needs of the crops), greater flexibility in the use of water, or some combination of these. Improvement in any of these dimensions will almost certainly increase productivity and therefore induce farmers to take the idea of users' groups more seriously.

6.13 These improvements are beyond the capacity of outlet groups. They are contingent on a radical change in system management involving fresh investments (especially for enabling better control over deliveries at the outlets); better formulated/transparent operational rules for the system; and confidence that the rules will be enforced. We have already suggested a three-phase programme for system improvement. The focus initially will be on investments necessary to effectively regulate deliveries at the minor/outlet level, and the formulation of clear operational rules in terms of which the entitlement of each segment in terms of quantum, duration and frequency of supply can be specified. This involves difficult questions of balancing the interests of efficient use with those of equitable distribution and current patterns of localisation and cropping patterns. Consultation with all segments of users in resolving these issues will not only facilitate better- informed and generally acceptable solutions but will also give a strong signal of

the government's seriousness about involving users. Also, there should be an inbuilt mechanism for the accountability of system managers in meeting these commitments to users.

6.14 After this initial phase, which will culminate in volumetric group delivery and pricing, farmers' groups can play a major role in planning and implementing more basic system improvements. The groups will have to play a greater role in promoting the optimum use of surface and groundwater resources for agricultural production. Traditionally, conjunctive use has been left wholly to unregulated individual initiative, but given its crucial bearing on productivity, it is a legitimate concern of public policy and group action. It is possible, with appropriate incentives, to make the users' groups play an effective role in securing the economical use of seepage and the wider distribution of the benefits.

6.15 In the longer run, the aim should be to get these groups actively, involved, in formulating and implementing system improvement programmes. The experience of command area development indicates that it has not been effective to the extent desired. The ingredients of farming system improvements - depending as they do on the soil conditions, size of holding, degree of fragmentation, the social and economic condition of individual farmers, their responses to market incentives and their perceived needs for production, subsistence and risk minimisation - are location specific and best planned in cooperation with users' groups.

6.16 As the demand for water increases and social pressure is generated for the equitable distribution of water, higher levels of efficiency in the use of water as well as the productivity of water must be attained. A judicious combination of the profit motive, financial assistance and social pressure for equity and greater dispersal of water rights would be needed for the successful transformation of the system. Depending on the local situation, various combinations may emerge. It is important to make available a wide range of technologies, organisational forms and related financial packages from which the farmers can choose.

Size and Function of User Group

6.17 The ideal would be to organise groups each covering relatively large areas (upto 500 ha. or even more) in order to get a tangible advantage in terms of reducing the burden (financial and managerial) on the system management and of improving the operation. However, this may not be always feasible initially. It may be necessary to start with relatively smaller groups and gradually expand them to cover a group of outlets in close proximity. In doing so, it is necessary to heed the view, especially among farmers, that multi-village outlets will be difficult for users to manage. As a practical matter, therefore, the users' groups might, to begin with, be organised on a village basis.

6.18 We envisage a contract between the system and each group regarding the volume of water and the frequency and duration of supplies to be made at the point where the group takes over, at specified rates per m³ of water. The contract should provide for adjustments in rates for

excess or short delivery and also some flexibility for groups with quotas in more than one season, to adjust inter-season use according to needs but contingent on the supply in the system.

6.19 The user groups will be wholly responsible for (i) maintenance of the channels below the point where the water is delivered (ii) payment of water charges to the system on the basis of an explicit contract, (iii) determining and enforcing the rules of allocation among the users served by the outlet as well as the rates to be charged from individual users. No restrictions will be imposed by the system on the crops to be grown, the construction of subsidiary storages or conjunctive use of seepage. These will be left to be regulated exclusively by the group. The groups will be free to determine the basis as well as the level of water rates and other additional service charges, if any. If this gives the group a surplus over the payment of dues to the government, that surplus will be available for meeting local repairs, maintenance and even improvement of facilities.

Promotion of Group Formation

6.20 Consulting farmers while making modifications and explaining the rationale of proposed changes and its potential benefits will help create an environment favourable for group action at the tertiary level. But farmers used to dealing with government officials rather than with each other in matters like water management cannot be expected to readily or quickly appreciate their common interest in and the benefits of collective management. There is bound to be scepticism about the benefits of the proposed, changes. Also, villages/farmers' groups are heterogeneous and have internal conflicts. The success of the early phases of the reform in handling these problems has a crucial bearing on how rapidly the restructured management/pricing system will spread. From this point of view great care should be taken to select initially villages/outlets which are favourably placed - especially in terms of the social homogeneity, relative freedom from conflicts and the existence of a strong local leadership - to demonstrate that substantial benefits come about from cooperation.

6.21 Farmers are likely to be reluctant to take on the obligations and responsibilities of group management,

especially if the system continues to provide water according to the area-based individual water demand on the same terms as for groups. It is therefore necessary to devise incentives which discriminate strongly in favour of farmers' groups and discourage individual service. The incentive will be strong if the revised rates are substantially lower for those who accept group-based volumetric charging than for those who wish to continue on the individual area-based demand system. Additional incentives would be the allocation of funds for system - improvement to effective farmers' groups which are willing and able to take over management responsibilities; and the entrustment to such groups of contracts for system-maintenance works in their vicinity.

6.22 The above inducements should be combined with (a) some form of "pressure" and (b) positive measures to support and nurture the groups directly and through voluntary organisations. In order to exert pressure, the government must declare its intention to withdraw, after a designated period of 5-10 years, from the responsibilities for management below the outlet and confine itself to delivering water for a specified duration at the minors or the outlets. The message to the farming community should be clear that the government considers the water users' groups as the main instrument for improving the management of the irrigation system. Government's commitment to the improvement of irrigation efficiency and farm productivity should also be visible, and the farmers should perceive the political will to improve cost recovery. This policy initiative should also be reflected in a time - bound programme of introducing group delivery and volumetric pricing.

6.23 The positive measures include, besides educating farmers about the rationale of the new system and its advantages, the cultivation of a supportive attitude on the part of the departments concerned (including the Irrigation Department) at all levels to the formation of groups, the provision of technical advice and assistance in working out rules and procedures for their operation, and the encouragement of voluntary organisations to play a larger role in the process.

Forms of User Organisation

6.24 An important question which needs consideration is the form that the farmers' groups should take. It is clear that the form should be one which makes the group a legal entity which is capable of entering into enforceable agreements. The government cannot enter into agreements with informal associations. At present there are three main ways in which such legal entities can be created: the establishment of cooperative societies under the Cooperative Societies Act, or of societies under the Societies Registration Act, or of a joint stock company under the Companies Act.

6.25 The cooperative and the registered society forms have been adopted in the limited number of cases of farmers' groups that we have come across. However, there are difficulties and rigidities under both the Cooperative Societies Act and the Societies Registration Act. There is little experience in India with the joint stock company form for managing water distribution to farmers.

6.26 A new possibility which we considered in our deliberations is that of providing (through suitable amendments) for the creation of legal entities by registration under the Irrigation Act of each state. We feel that it would be useful to explore this possibility further.

6.27 However, we do not propose to make any specific recommendations on the form that the farmers' groups should take. This is a matter for each State Government to consider in the light of local circumstances. As mentioned earlier, in West Bengal tubewell assets have been transferred to panchayat samitis who take up the responsibility for collection through

beneficiaries committees. This form can also be adopted with suitable modifications for the canal water users' association. There should be room for flexibility in the structure and procedures of outlet organisations. No single standard blue print will do

Role in System Improvement

6.28 There is a considerable on-going debate on the role of users' groups in system improvement. Generally the work of system improvement above the point at which farmers' groups take over is best left to the Irrigation Department. We have already recommended that investments for upgrading the system to handle volumetric delivery be given high priority. The commitment of funds for further improvements and the implementation of works should be contingent on the progress made in the formation of water users' groups.

6.29 While the government will necessarily have to play the lead role in main -system improvement, users' groups, once established on a widespread basis, could play a role in the process. How this could be accomplished is likely to become an important issue. An appropriate organisational form comprising the government, the financial institutions and users will have to be evolved. One possibility is a joint stock company. But the structure and modalities of this and other forms need to be worked out in some detail.

6.30 The case for the active involvement of users' groups in improvement below the point at which they take over is much stronger, as detailed local knowledge and consensus is very critical for this activity. Cost-sharing by the beneficiaries would bring about cost-consciousness, and the execution of improvements may be contracted to the water users. Here again the modes of participative planning and implementation process should be established in the light of the experience of some well chosen pilot projects. Even if government irrigation departments take the main responsibility, the planners of improvement should consult users' groups and allow for the modification of technical features and phasing in the light of such consultation.

Role of Voluntary Organisations

6.31 With a few exceptions it has been established that the process of initiation of group formation cannot be left entirely to the government. The working out of the memorandum of understanding ' and the establishment of the modalities of sharing of responsibilities and mutual obligations by farmers and the Irrigation Department, requires mediation which can best be provided by voluntary organisations. In any case, the sheer magnitude of the problem makes it imperative to encourage initiative from wherever it is forthcoming-whether voluntary organisations such as cooperatives or non-profit groups or public -interest activists. Well-established voluntary organisations with a proven track record could be called upon to promote water user groups. Voluntary organisations have advantages in regard to flexibility and autonomy, as well as previous association with the community in the group-management of

various activities. They usually lack professional manpower for management and technical functions, but this can be overcome by encouraging them to create a cadre of paratechnologists.

6.32 It is useful to distinguish between two different types of roles which voluntary organisations can play. One is to promote group-formation at specific outlets. The voluntary organisations' role here is often crucial in the initial stages of group-formation, but they must phase themselves out as soon as the group is able to stand on its own. A second type of function is to provide an independent but informed contribution to decisions concerning the system and to work with farmers' groups to test alternative upgradation priorities and techniques and methods of achieving Phase II and Phase III objectives; and to formulate optimal strategies for overall agricultural transformation. This is a broader, long-term role, which requires pooling together the knowledge and expertise of various voluntary organisations involved in the promotion of farmers' groups so that farmers' priorities and needs are effectively brought into the planning of system-modification and improvement. It must be reiterated that in both these functions the role of voluntary organisations is temporary. Eventually all the tasks mentioned have to be performed by the water users' associations, with the Irrigation Department retaining responsibility for the regulation, monitoring and maintenance of the main system.

6.33 Where, with modest efforts and small financial outlays, the irrigation system can be brought to a reasonable level of performance, the promotional role of voluntary organisations would be limited to the creation of awareness and the negotiation of the MOU with the Irrigation Department. The technical support would consist mainly of helping the farmers to check the system so that the main system can meet its obligations. Management and technical support will also be needed to help the groups to assess the costs of operation and maintenance and the liabilities they will have to bear. In situations where systems need major modifications and/or involve difficult technical problems, the process will take longer and more sustained efforts.

6.34 Various types of organisations can perform the promotional role, and the extent of participation of the government agencies would vary. The experience of voluntary organisations in Gujarat such as AKRSP¹ and Sadguru Seva Foundation, and CASAD² in Maharashtra, can be studied to create the appropriate type of non-profit voluntary organisation. The resources and expertise of training and research institutions, management and administration such as IRMA³, IIM⁴, the Administrative Staff College of India, WALMI⁵, and the water resource departments of technical universities, need to be availed of in a purposeful manner. WALMIs⁵ can be entrusted

¹ AKRSP = Aga Khan Rural Support Programme

² CASAD = Centre for Applied Systems Analysis in Development, Bombay

³ IRMA = Institute of Rural Management, Anand

⁴ IIM = Indian Institute of Management, Ahmedabad, Bangalore and Calcutta.

⁵ WALMIs = Water and Land Management Institutes.

with the task of identifying voluntary organisations and evaluating their performance, but they should have the freedom to choose their partners in promotional work and recruit non - government professionals.

Special Fund for Promotion/Pilot Projects

6.35 Funds for the promotional effort and the system - improvement work of pilot projects should not be tied to project funds. This is because local initiative may not be forthcoming where system - improvement funds are available for on - going large projects. Sometimes it is easier to improve the system on a medium project.

6.36 It seems worthwhile to create a special fund in each State for financing the promotional work and pilot projects for system - improvement. The success of the effort for promoting water users' groups will depend on the initiative of the State Government in taking up pilot projects and giving a performance orientation in the allocation and disbursement of funds.

CHAPTER -7

IMPLEMENTATION

Introductory

7.1 We now turn to the problem of translating the general principles regarding the pricing of water recommended in Chapter 3 into specific rates. Our focus is mainly on Phase I, namely, the structuring of the existing system of pricing from a highly differentiated crop-area-based assessment to one comprising a basic area rate and a variable season- hectare rate. What we intend to do here is to indicate (a) the order of increase in irrigation revenues which will be necessary in the country as a whole in order to cover the O&M costs and 1 per cent interest on capital employed; (b) indicate in general terms the manner in which the required additional revenues can be generated; and (c) illustrate the application of the methodology for determining season-hectare rates.

7.2 The cost of service to be recovered in Phase I includes operation and maintenance expenditures (including salaries of operating field establishment and departmental overheads) and 1 percent interest on cumulative capital investment three years prior to the reference year. The reference year has been taken as 1989-90 - the latest year for which we have estimates of irrigated area, expenditures and capital outlays.

Application of Suggested Approach (Phase-I)

7.3 We have recommended in chapter 4 that O&M costs should be based on norms to be worked out after a detailed review by State/region and category of projects. This task will have to be taken up by the State Governments. Pending that, for the purposes of illustrating the application of the suggested approach to the revision of water rates, we use the norm suggested by the Jakhade Committee, namely, Rs.180 per ha. of gross irrigated area, with the following adjustment: allowance has been made for the increase in costs because of inflation since 1987 when the committee made its estimates. The inflation-adjusted figure of O&M expenses (including a provision of Rs.50 for regular establishment) in 1989-90 corresponding to the Jakhade Committee norm is Rs.220 per ha. The norm does not include departmental overheads. Consistent with our earlier suggestion about the level of 'overheads chargeable, we have made a notional allowance of 25% of the Jakhade Committee norm for these items. With this, the O&M costs to be recovered works out to Rs. 270 per ha.

7.4 For the country as a whole, the cumulative capital outlay on major and medium projects at the end of 1986-87, i.e., three years prior to 1989-90 (the reference year), was of the order of Rs.20,000 crores. Interest @ 1% on this amount averaged over an estimated 27.9 million ha

irrigated by this outlay works out to a little over Rs.70 per ha. On this basis the total recoveries in phase-1 should average around Rs.340 per ha.

Order of Increase Needed

7.5 As against this, the estimated gross receipts from major and medium projects in 1989-90 was Rs.68 per ha. Details of the breakdown of this into direct and indirect revenues per ha are not available. Assuming these to constitute the same proportions of gross receipts as during 1984-86 - the latest period for which such data are available - the actual irrigation revenue works out in 1989-90 to Rs. 50 per ha. (Note that this is no higher than the realisation during 1983-84 to 1985-86).

7.6 As noted earlier, the revenue from sales of water for non- irrigation uses and other miscellaneous receipts accounts for a substantial part (31 percent in 1984-86) of gross receipts. Out of this, pending detailed analysis, it may be assumed that miscellaneous receipts per ha will remain at the present level. Receipts from the sale of water for non irrigation uses (at present 7 percent of the total) can be expected to grow. The volume of water allocated for domestic and industrial use is bound to grow rapidly in the future. There is scope - as the experience of States such as Gujarat has shown - for a substantial increase in rates especially for industrial uses. However, we are not in a position to assess the extent of additional revenues which can be secured from this source. This requires detailed data and analysis which are simply not available at present. Clearly, the larger the contribution of non- irrigation uses, the lesser the amount to be recovered from farmers. Assuming conservatively the additional revenue on

this account at Rs 10 per ha, the recovery from irrigation charges has to be Rs 310 per ha compared to the present realisation of approximately Rs 50 per ha. (see Table 7.1)

Table - 7.1

Composition of present and required revenues from Major and Medium Works

	1983-85 Realised	1989-90	
		Realised (Rs/Ka)	Assumed/ Required
irrigation Direct and indirect	48	48	310
On-Irrigation users	5	5	15
their Miscellaneous	15	15	15
gross receipts	68	68	340

7.7 The additional irrigation revenue to be mobilised has to come from four sources; (1) improving the assessment and collection of existing rates; (2) the introduction of a uniform basic levy per ha of irrigable command; (3) the rationalisation of the rate-structure to equalise rate per unit of water across crops within each season; and (4) a revision of the general level of rates.

Improvement of Collection

7.8 During the latter half of the eighties, information available in respect of 9 major States suggests that annual collections average around 80 per cent of the demand (Table-5-1). This does not allow for under-assessment arising from non-recording or mis-recording of irrigated area (especially under high-rated crops). If this is taken at 10 per cent, stricter assessment and collection should increase revenue collection by 35-40. per cent of actual receipts (Rs. 17-20 per ha) without any change in the level or structure of rates.

Proposed Basic Levy

7.9 We have proposed a basic levy on all land covered by public irrigation systems throughout the country. A levy at the rate of Rs.50 per ha is recommended for all lands in the cultivable commands¹ of major and medium as well as - minor works. This is intended as a fee for the right to get water from the system (a sort of "demand charge"). Those who have not got any water or are unlikely to get water can opt out of the system, but they will also forfeit the right to get water when it is available. This levy will dampen the clamour to over-extend the command and, more importantly, will generate pressure on the system managers to provide a minimum level of service to all segments of the command and thus help the process of improving the quality of service.

Rationalisation of Existing Structure

7.10 The third element is the rationalisation of rates. We have noted in Chapter-2 that in several States, water-intensive crops which usually give high values of output per hectare (though not necessarily per unit of water consumed) are being charged less, sometimes considerably less, than the irrigated dry (ID) crops (such as coarse cereals, pulses and oil-seeds) . In order to remove this anomaly, the per hectare rates on water-intensive crops need to be raised so that the rate per unit of water is equalised across crops. Such an adjustment will usually mean substantially raising rates on paddy and perennial crops.

7.11 This is purely illustrative. Considerable refinements are feasible for instance, finer distinctions between seasons; adjusting rates with reference to the weighted average for ID crops; and allowing for situations (as in Orissa) where crops other than coarse cereals, pulses or oil seeds bear a higher rate per unit of water consumed. The important point is that the revenue potential of a rationalisation of rates on the above principles is substantial.

7.12 The additional revenue will be sizeable, the increase ranging from 18 to 140 percent of revenues at current rates, if the ha cm rates for all crops are made equal to the irrigation rate now

1 For this purpose, cultivable command also includes areas within a command benefitting from irrigation through lifting water from the system or from groundwater .

charged for ID crops, and from 50 to 325 per cent if they are made equal to the highest rate per ha cm (See Annexure 7.1)

Raising Level of Rates

7.13 It is clear, however, that the above measures will not be adequate in all States to meet the gap between current revenues and the level required to meet the O & M costs, overheads and even 1% interest on capital. The level of rates will also have to *be* raised. The extent of increase required, depending as it does on the potential for rationalisation, cannot be quantified. It is also likely to vary from State to state. Nevertheless, on the average the required revenue by way of irrigation charges (Rs.310 per ha) will still be barely 6% of the gross produce per hectare of the irrigated area¹¹, and that without taking any account of likely improvement in productivity. The Irrigation Commission of 1972 considered 5-12 percent of gross produce as a reasonable level of water charges to be recovered from farmers.

7.14 These rates are worked out on the basis of existing arrangements whereby the Government bears the responsibility for maintenance, water distribution to outlets commanding 5 - 40 ha and assessment and collection right up to the individual farms. These costs can be substantially reduced if farmer's groups takeover the responsibility for maintenance and water distribution at the minor or distributary Level. The larger the command of the point at which group delivery is introduced, the greater the reduction in governmental cost. On this ground, and more importantly, as a measure of inducement for farmers' groups to take over greater responsibility, we suggest that when the proposed revisions are implemented, the rates for group delivery be fixed at substantially lower levels than for individual delivery, while keeping the basic fee of Rs.50 per ha. common.

Phases II and III

7.15 In Phase-II the basic rate per ha of CCA will continue but should be related to an obligation on the part of the system to provide a minimum level of service defined in terms of volume of water for the staple crop seasonal. The variable rate will be switched progressively to a volumetric rate for group users (at a rate substantially below the volume rates implied in the season-hectare rates applicable for individual service)-The pace of introduction of volumetric rates will depend on the speed with which main system facilities are upgraded to permit effective control over deliveries, revised operational plans are drawn up and farmers' groups are formed. As these take effect, and the productivity of water increases, the variable rate can be raised so that the O & M costs(which should be lower than under existing arrangements) and a

1 The national average of production per gross irrigated hectare in 1979-83, valued at 1986-87 prices, is estimated at Rs. 4900.

larger part of the capital-related charges are recovered. Full cost recovery should be the goal for Phase-III.

Variations in Under-Recovery of Costs

7.16 We do not have Statewise norms of O & M. However, it is to be expected that these norms will differ among States; so will the overheads and interest on capital. Again by way of illustration, Table 7-2 provides the comparison between actual collections per ha and the actual working expenses, overheads and interest charges in 1984-86. These estimates are intended to highlight the differences among States in the under-recovery of costs. The actual rate determination will be based on more recent data and O&M expenditure norms to be worked out by categories of projects and regions in each State.

7.17 The extraordinarily high gap between current and required revenues in some states like Tamil Nadu is more apparent than real. The gap would be much smaller if the receipts on account of irrigation recovered as part of land revenues are fully accounted. In these States there is a case for separating the irrigation component from the wet assessment so that all irrigated lands can be charged according to uniform principles. Also, to the extent that some States have already revised rates substantially as in the case of Gujarat and Maharashtra the picture would be different today from that shown in the table.

Table 7.2

Estimated costs and Revenue of Major and Medium Irrigation and multi purpose projects, major State 1983-84 to **1985-86**

	Estimated working expenses Rs.10 ⁶	GIA 10 ⁶ ha.	Cost/ ha	Water ² delivered ha. (ham)	Cost/ham (Rs.)	Gross Revenue (10 ⁶ Rs.)				Increase in Revenue required to cover cost	
						Total	Irrigation	Water Sales	Other receipts	Rs.10 ⁶	as a multiple of current gross receipts.
Andhra Pradesh	517	3.03	172	0.682	252	175	NA	43	132	342	1.95
Bihar	422	2.17	194	0.845	230	92	92	-	-	330	3.58
Gujarat	422	0.70	603	0.650	928	86	67	10	9	336	3.91
Haryana	344	1.74	198	0.838	236	104	88	-	16	240	2.31
Karnataka	301	1.11	271	0.830	327	63	-	-	63	238	3.78
Kerala	66	0.51	129	0.677	191	12	8	2	2	54	4.50
Madhya Pradesh	490	1.32	371	0.860	431	125	55	24	46	365	2.92
Maharashtra	450	0.96	469	0.800	586	131	83	16	32	319	2.43
Orissa	136	1.51	90	0.983	92	54	22	-	32	82	1.51
Punjab	294	2.45	120	0.903	133	121	89	14	19	173	1.42
Rajasthan	605	1.42	426	0.732	582	131	116	6	10	474	3.61
Tamil Nadu	273	1.22	224	1.070	222	13	5	3	5	260	2000
Utter Pradesh	932	5.52	169	0.820	206	600	581	5	14	332	0.55
West Bengal	200	1.47	136	1.100	124	13	12	-	1	187	14.38
All above States	5457	25.13	216	0.839	257	1720	1218	123	381	5730	2.17

1. Working expenses of major and medium multi purpose projects as reported by CWC (Average for 3 years centered on 1984-85) plus 25% overheads plus 1% interest on cumulative capital outlay at the end of 1981-82 (i.e. 3 years prior to 1984-85)
2. Based on CWC estimates for storage projects. It is assumed that this applied also to run-of-the-river schemes.

Potential of Increased Revenue

7.18 The potential for increased revenue through the stricter enforcement and collection of existing rates also varies. While little is known about the incidence of under- assessment in any State, the revenue potential of better collection is some what better known. The gap between demand and collections is negligible in States such as Punjab, Haryana and Uttar Pradesh, but as high as 70 per cent of demand in West Bengal. In Bihar, Maharashtra Gujarat, Madhya Pradesh and Rajasthan the gap ranges between 25 and 40 percent. The revenue potential of better collections is seen to be high in those States where the order or increase in revenue required to meet the cost recovery standards recommended is also large. In such situations, efforts to improve assessment and recoveries must be given high priority.

7.19 As for the rationalisation of rates, we have already referred to an illustrative exercise for six States on the basis of existing crop patterns, irrigation rates and cropwise water allowances in existing major and medium projects as given by the CWC. The scope for augmenting revenues through the rationalisation of the existing rate- structure is substantial but variable. In general it shows that rationalisation calls for a significant hike in the area rates for water-intensive and perennial crops.

7.20 The above exercise was based on estimates of overall irrigation duty for various crops without differentiating between seasons and without making any allowance for the fact that there are evaporation losses and costs of building storage necessary to carry over water from the rainy kharif season to irrigate rabi and summer crops. In order to devise the structure of water rates on a season-hectare basis which would take these considerations into account, a more elaborate procedure is needed. This procedure, which also leads to a rationalisation of the rate structure, has been applied in an illustrative manner for all major States. The assumptions, data and procedures are detailed in Annexure-7.2. The relative per hectare rates applicable to paddy, and other seasonal crops in each season in order to recover Rs.100 per ham are also estimated. It is apparent that the existing rate structures will need substantial revision if they are to fully reflect the relative water-intensities of various crops and seasons, as well as the costs of carrying over water from surplus to deficit seasons. The rationalization of the rate-structure along the lines discussed may by itself help to reach the targeted level of cost recovery in some States, but in general an increase in the general level of rates will also be needed if the cost-recovery objectives of Phase-I are to be realized.

7.21 It needs reiterating that these are illustrative of the implications of our approach and the manner in which the structure of season hectare rates consistent with water consumption is to be determined. The relative importance of different sources of additional revenue (better assessment and collection, rationalisation of rate-structure and revision of rates) and therefore the strategy to be adopted to raise the required revenues, will necessarily differ across States. Also, the level and structure of rates requires the determination of O&M norms relative to

irrigation needs of crops by season and for different categories of projects by agro-climatic regions. This is an exercise which the States need to undertake.

Implementation: Task Force

7.22 The implementation of the approach suggested here will therefore require expeditious action on the part of each State to set up task forces, with adequate expert staff and authority for collecting the necessary data to determine O&M norms (including regular establishment and overheads) by region and category of projects; undertake sample studies in the field to determine the extent of under-assessment and under-collection at existing rates; determine for each category of projects, given the existing crop-pattern and their irrigation needs, the per hectare rates applicable to paddy and other seasonal crops by season and for perennials in line with the requirements in terms of volume of irrigation and costs connected with carryover between seasons; and work out the existing and projected use by non-agricultural users and determine the rates to be charged to such users, the appropriate contractual arrangements and other relevant details.

Phased Programme for Group Delivery

7.23 Simultaneously, a programme to encourage users' groups should be initiated in carefully selected segments of each systems where the environment and social configurations are most conducive to success. A phased programme for switching over to group delivery should be announced and, along with it, steps taken to help the formation of organisations directly and through voluntary organizations with supporting training facilities for farmers and for irrigation functionaries. In tandem with these, programmes for upgrading the capabilities of existing systems to manage regulated delivery to groups and working out the operational rules in terms of which the groups will enter into contracts with the system should be launched.

The Role of the center

7.24 While, ultimately, the prerogative of and the responsibility for implementing our recommendations vests with the States, the Centre and the Planning Commission can help the process by active intercession with the State Chief Ministers to explain the rationale and urgency of the proposed reforms and secure a national consensus on the direction and the principles for restructuring the management and pricing of water. Individual States will find it easier to undertake major changes if there is such a consensus.

7.25 The Centre can also support the reforms through a programme of public education to explain their rationale; provide financial and technical support for initiatives to demonstrate the feasibility and advantages of group-management; and persuade States to earmark sufficient funds for upgrading system-capability for introducing group-based volumetric supply and pricing. The National Water Management Project (NWMP), which needs to be substantially

expanded and reoriented in the light of our recommendations, would seem to be an appropriate instrument for this purpose.

Reintroduction of Financial Return Criterion for Projects

7.26 We would further recommend that commitment to earning a minimum financial return - starting with recovery of O&M costs plus 1 percent on capital outlay - be reintroduced, along with the test of viability in terms of social benefits relative to social costs, as essential criteria for sanctioning all investment proposals whether for new projects or for the improvement of existing projects.

Conclusion

7.27 The approach suggested by us involves radical changes in the way irrigation systems are organised and managed even as it requires users to pay substantially higher prices for the water they use. But we are confident that these changes are essential and important constituents of any effort to improve public finances generally and that of the State Governments in particular. They are also required as part of an effort to improve the productivity of irrigated agriculture by making farmers aware of the value of water and at the same time enabling them to get a larger output per unit of water delivered by public systems. Such improvements are critical to sustaining the tempo of agricultural development. We hope that our recommendations will help initiate much needed reforms leading to a rational system of pricing water along with an improved, more productive irrigated agriculture.

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No.16(134)/ 90-I&CAD
Government of India
Planning Commission

Yojana Bhavan, Sansad Marg,
New Delhi - 110 001.

Dated 23rd October, 1991

NOTIFICATION

Sub:- Constitution of Committee on Pricing of Irrigation Water

1. It has been decided to constitute a Committee on Pricing of Irrigation Water under the Chairmanship of Dr. A. Vaidyanathan of Madras Institute of Development Studies, Madras and formerly Member, Planning Commission. The constitution of the Committee is as under :-

- | | | |
|----|---|---|
| 1. | Dr. A. Vaidyanathan,
Madras Institute of Development Studies, Madras | (Former Member,
Planning Commission)
Chairman |
| 2. | Shri Ramaswamy R. Iyer,
* Visiting Professor, Centre for Policy Research Dharma Marg
Chankyapuri, New Delhi - 110 021 | Member |
| 3. | Shri V.B. Patel, Former Chairman
C.W.C., II, Chandra Moulli Society Nava Vadej, Ahmedabad -
380 013 | Member |
| 4. | Dr. J.P. Singh, Additional Secretary **
Ministry of Water Resources | Member |
| 5. | Shri B.N. Navalawala, Adviser (I&CAD)
Planning Commission, New Delhi | Member |
| 6. | Shri M.S. Reddy, Member (WP) CWC
Sewa Bhavan, R.K. Puram, New Delhi 110 066 | Member |

* Former Secretary (Water Resources) Government of India,

** was represented by Shri R.L. Pardeep, Additional Secretary, Ministry of Water Resources, Government of India,

7.	A representative of the Ministry of Agriculture (Not below the rank of Joint Secretary)	Member
8.	Shri Dharam Vir, * Director General, Central Revenues (I) IP Estate, New Delhi-110 002	Member
9.	Secretary, Irrigation Department, Government of Andhra Pradesh, Hyderabad	Member
10.	Secretary, Irrigation Department, Government of Assam, Guwahati-781 001	Member
11.	Secretary, Irrigation, Government of Uttar Pradesh, Lucknow	Member
12.	Secretary, Irrigation, Government of Maharashtra, Mantralaya, Bombay-400 001	Member
13.	Secretary, Irrigation and Waterways Department, Government of West Bengal, Writers Building, Calcutta-1	Member
14.	Dr. V.J. Patel, Jivaraj Patel, Agaro-Forestry Centre, Surendra Baugh Kardoj 364-061, District Bhavnagar (Gujarat) (A Farmer's representative)	Member
15.	Shri B.B. Karajagi, Chief Engineer (IM), Central Water Commission	Member ** Secretary

II. The Terms of reference of the Committee will be as given below:-

- i. To review the existing water rate structure and the extent of subsidy in Government and Public sector irrigation projects.
- ii. To suggest:
 - a. the norms for fixing water rates;
 - b. the norms for cost escalation in O&M component of economic water rates.
 - c. the norms for conversion of volumetric supply of water rates of corpwise/areawise water rates for different agro-climatic zones;
 - d. the organizational measures including mechanism for efficient recovery of economic water rates; and
 - e. Operating controls of ensuring levy of appropriate irrigation water rates by the States.

* Shri Dharam Vir, since appointed as Additional Deputy Comptroller and Auditor General

** was replaced by Shri M.L. Lath, Commissioner (WM), Ministry of Water Resources, Government of India.

- iii. To evolve a rational water rated structure for both surface and ground water to promote conjunctive use.
 - iv. To review the present status of maintenance of irrigation projects in different states.
 - v. To review the norms of maintenance as recommended by earlier committees and different Finance Commission.
 - vi. To suggest the norms for fixing maintenance charges including stipulating the upper ceiling per hectare of command for the expenditure on staff establishment for various irrigation systems in different states.
- III. The Committee may constitute sub-group, if necessary and co-opt Member for specific Task/ Study.
- IV. Expenditure of the member on TA/ DA in connection with the meeting of the Task Force will be borne by the respective Department/ Ministry/ Organisations. Expenditure in respect of non-official members will be borne by the Planning Commission as per the rules and regulations of TA/ DA applicable to Group 'A' officers of the Government of India.
- V. The Committee will submit the final report within four months from the date of notification.
- VI. Hindi version follows.

Sd/-
(I.S. Ahluwalia)
Director (Administration)

All Members

Copy to :

1. Secretary (Co-ordination) Cabinet Secretariat, Rashrapati Bhavan, New Delhi.
2. The Comptroller and Auditor General of India, 10, Bahadurshah Zafar Marg, New Delhi.
3. Secretary, Ministry of Water Resources, Shram Shakti Bhavan, New Delhi.
4. Secretary, Ministry of Agriculture, Krishi Bhavan, New Delhi.
5. Secretary (Expenditure) Ministry of Finance, North Block, New Delhi.
6. Chairman, Central Water Commission Sewa Bhavan, R.K. Puram, New Delhi-66.

Planning Commission

- 1) PS to Deputy Chairman/ Member (R)/ Member (P)
- 2) PS to Secretary/ Special Secretary
- 3) Principal Adviser (Agriculture)
- 4) Advisers (PC)/ SP/ (I&CAD)
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Sd/-
(I.S. Ahluwalia)
Director (Adm.)

No.16 (134)/ 90-I&CAD

Government of India

Planning Commission

Planning Commission,
Yojana Bhavan, Sansad Marg,
New Delhi - 110 001.
Dated 5th Dec., 1991

CORRIGENDUM

Sub: Constitution of Committee on Pricing of Irrigation Water

In partial modification of this office notification of even number dated 23rd October, 1991, the following changes are made with immediate effect:

1. Shri R.L. Pardeep, Additional Secretary, Ministry of Water Resources, Shram Shakti Bhavan, New Delhi, will be a member of the Committee in lieu of Dr. J.P. Singh.
2. Shri M.L. Lath, Chief Engineer (WM), * Ministry of Water Resources, Lok Nayak Bhavan, New Delhi will be the Member Secretary of the Committee in lieu of Shri B.B. Karajagi, Chief Engineer (IM), Central Water Commission.

All other terms and conditions as set for the Committee remain unchanged.

Sd/-

(N.K. Malhotra)

Deputy Secretary (Admn.)

To

All Members of the Committee

Copy to :

1. Secretary (Co-ordination) Cabinet Secretariat, Rashtrapati Bhavan, New Delhi.
2. The Comptroller and Auditor General of India, 10, Bahadurshah Zafar Marg, New Delhi.
3. Secretary, Ministry of Water Resources, Shram Shakti Bhavan, New Delhi.
4. Secretary, Ministry of Agriculture, Krishi Bhavan, New Delhi.
5. Secretary (Expenditure) Ministry of Finance, North Block, New Delhi.
6. Chairman, Central Water Commission Sewa Bhavan, R.K. Puram, New Delhi - 66.

* Redesignated as Commissioner (WM) before the first meeting of the Committee.

No.16(134)/ 90-I&CAD

Government of India

Planning Commission

Yojana Bhavan, Sansad Marg,

New Delhi - 110 001.

Dated 20th Feb., 1992

CORRIGENDUM

Sub: Constitution of Committee on Pricing of Irrigation Water

In partial modification of this office notification of even number dated 23rd October, 91 and corrigendum of even number dated 15.12.91, the following additions in the constitution of the Committee are, made with immediate effect:

1.	Secretary, Irrigation, Govt. of Haryana, Chandigarh	Member
2.	Shri K.R. Datye, Consulting Engineer, Ganesh Kuteer, First Floor, Prarthana Samaj Road, Ville-Parle (East), Bombay-400 057.	Member

The committee will submit the final report by 30th 1992.

Sd/-

(N.K. Malhotra)

Deputy Secretary (G.A.)

To

- All Members of the Committee

Copy to :

1. Secretary (Co-ordination) Cabinet Secretariat, Rashrapati Bhavan, New Delhi.
2. The Comptroller and Auditor General of India, 10, Bahadurshah Zafar Marg, New Delhi.
3. Secretary, Ministry of Water Resources, Shram Shakti Bhavan, New Delhi.
4. Secretary, Ministry of Agriculture, Krishi Bhavan, New Delhi.
5. Secretary (Expenditure) Ministry of Finance, North Block, New Delhi.
6. Chairman, Central Water Commission Sewa Bhavan, R.K. Puram, New Delhi-66.

Planning Commission

- PS to Deputy Chairman/ Member (R)/ Member (P)
- PS to Secretary/ Special Secretary

- Principal Adviser (Agriculture)
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Sd/-
(J.N. Nanda)
Deputy Adviser (I&CAD)

No.16(134)/ 90-I&CAD
Government of India
Planning Commission

Yojana Bhavan, Sansad Marg,
New Delhi - 110 001.
Dated 17th August, 1992

CORRIGENDUM

Sub:- Constitution of Committee on Pricing of Irrigation Water

In partial modification of this office notification of even number dated 23rd October, 1991 and corrigendum of even number dated 15.12.1991 and 20.02.1991, the term of the above Committee is extended up to 15.09.1992.

Sd/-
(N.K. Malhotra)
Deputy Secretary (G.A.)

To

All Members of the Committee

Copy to :

1. Secretary (Co-ordination) Cabinet Secretariat, Rashrapati Bhavan, New Delhi.
2. The Comptroller and Auditor General of India, 10, Bahadurshah Zafar Marg, New Delhi.
3. Secretary, Ministry of Water Resources, Shram Shakti Bhavan, New Delhi.
4. Secretary, Ministry of Agriculture, Krishi Bhavan, New Delhi.
5. Secretary (Expenditure) Ministry of Finance, North Block, New Delhi.
6. Chairman, Central Water Commission Sewa Bhavan, R.K. Puram, New Delhi.

List of Irrigation Projects visited and meetings held with the State Officials during the Committee's visit to selected States.

State	Meeting	Date	Name of the Irrigation Project/ WUA visited & meeting held
1. Maharashtra	Second Meeting **	3rd Feb. 1992	(i) Mula Irrigation Project (ii) Sri Dutta Sahakari Pani Watap Society Ltd. Chanda, Tal. (iii) Meeting with Secretary, Irrigation, Govt. of Maharashtra at Irrigation Rest House, Ahmednagar
		4th Feb. 1992	(i) Khadakwasla Irrigation Project (ii) Cooperative Agriculture Society, Manjari.
2. Gujarat	Third Meeting	5th March, 1992	(i) Meeting with Cnairmar, Sardar Sarovar Narmada Nigam Ltd., Secretary, Irrigation, and other officials of the irrigation Deptt., Government of Gujarat at Circuit House Annexe, Ahmedabad. (ii) Horticultural Farm at Pipardy and Kobdi. (iii) Jivara Patel Agro Forestry Centre, Curendra Baugh.
		6th March, 1992	(i) Mahi-Kadana Project (ii) Water Users' Association Anklay. (iii) Khedut Irrigation (TW) Coopt. Society Sundal Fura. (iv) Meeting with Secretary, Irrigation & official of concerned Departments, Govt. of Gujarat, officials of WALMI and IRMA and representatives of Water

* First meeting of the Committee was held on 16th December, 1991 at Yojana Bhavan, New Delhi

			Users' Associations and Experts at WALMI, Anand.
		7th March, 1992	(i) Sardar Sarovar Narmada Project (Under Construction) .
3. Uttar Pradesh	Fourth Meeting	10th April, 1992	(i) Eastern Yamuna Canal (ii) Meeting with Chief Engineer, Irrigation, and other officials of Irrigation Deptt., Govt. of U.P. and representatives of the farmers at village Phulkhari. (iii) Upper Ganga Canal, near Roorkee. (iv) Meeting with the officials of U.P. state Irrigation Deptt. at Bhimgoda Headwords on Upper Ganga Canal in Haridwar.
4. Haryana	"	11th April, 1992	(i) Augmentation Tubewell Project. (ii) Western Yamuna Canal, (iii) Meeting with Superintending Engineer, Western Yamuna Canal Circle, Karnal at Karnal. (iv) Private Tubewell at village Kachhava near Karnal.
		12th April, 1992	(i) Committee called on Deputy Chairman, Planning Commission & Member (Irrigation) & Member (Agr.) in Yojana Bhawan, New Delhi.
5. Orissa	Fifth Meeting	7th May, 1992	(i) Mananadi Delta Stage-I (ii) Meeting with Chief Engineer, Irrigation & Flood Control, and other officials of Irrigation & Revenue Departments, Govt. of Orissa & representatives of Farmers at Kendu, Patna. (iii) On-farm development work (OFD) at Matiapada. (iv) Meeting with State officials of irrigation Deptt. & representatives of farmers at Gop.

		8th May, 1992	<ul style="list-style-type: none"> (i) Mahanadi Delta Stage-II (ii) Meeting with State officials of Irrigation & Revenue Departments and representatives of farmers at Sakhi Gopal. (iii) Meeting with Senior Officials of State Govt. of Orissa viz. Development Commissioner & Secretary Planning Co-ordination; Principal Secretary (Finance); Secretary (Irrigation); Secretary (RD); Secretary (Rev.); Secretary (Agri.) Engineer-in-Chief, Irrigation at Sectt. Conference Room, Bhubaneshwar.
6. Andhra Pradesh	Sixth Meeting	7th June, 1992	<ul style="list-style-type: none"> (i) Sriramsagar Project (ii) Meeting with State officials of Irrigation and Revenue Departments & representatives of farmers at Pochampad.
		8th June, 1992	<ul style="list-style-type: none"> (i) Krishna Delta Project (between Vijayawada & Vayyur). (ii) Meeting with District Collector & other State officials of Irrigation & Revenue Departments, local MLAs & MP and representatives of farmers at Vayyur.
		9th June, 1992	<ul style="list-style-type: none"> (i) Meeting with Experts at Sectt. Committee Room, Hyderabad. (ii) Meeting with Special Chief Secretary, Secretary Planning and Finance, Govt. of Andhra Pradesh and other officials of 8 concerned Departments at Secretariat Committee Room, Hyderabad.

List of Dates and Venues of various Meetings (Seven) held by the Committee

Meeting	Date of Meeting and Field Visit	Venue of the Meeting
First	16th December, 91	Committee Room Ministry of Water Resources, Shram Shakti Bhavan, New Delhi.
Second	2-4th Feb. 92	Pune Irrigation Circle, Sinchal Bhavan, Pune in Maharashtra
Third	5-7th March, 92	Sardar Sarovar Narmada Nigan, Guest House, Ke Madia, in Gujarat.
Fourth	10-12th April	Yojana Bhavan, New Delhi
Fifth	6-8th May, 92	Secretariat of Government of Orissa at Bhubaneswar.
Sixth	7-9th June, 92	Secretariat of Government of Andhra Pradesh at Hyderabad.
Seventh	19-21st August, 92	Yojana Bhavan, New Delhi.

Note: In addition, the Drafting Sub-Committee of the Committee on Pricing of Irrigation Water held a four day meeting from 14th to 17th July, 92 at India International Centre at New Delhi for preparation of the Draft Report of the Committee.

ANNEXURE-1.4

(Para 1.18)

List of Specialists/ Experts with whom the. the Committee held discussions.

S.No	Name of the Specialists/Experts	Present Status
1.	Shri C.C. Patel	Chairman, Sardar Sarovar Narmada Nigam Limited (Gujarat)
2.	Prof. Tushar Shah	IRMA, Anand (Gujarat)
3.	ShriK.B.Shah	Rtd. Chief Engineer now Consulting Engineer, Ahmedabad.
4.	Dr. Mahesh Pathak	Hon. Director, Agro-Economic Research Centre, Vallabh Vidyanagar (Gujarat)
5.	Shri S.N. Lele	Centre for Applied Systems Analysis in Development (CASAD) Bombay.
6.	Dr. A. Sunder	WAHANA Consultants Pvt. Ltd. Hyderabad
7.	Shri Satyanarayan Singh	WAMANA Consultants Pvt. Ltd. Hyderabad.
8.	Shri M.S. Billore	Former Secretary (WR) and Member, State Irrigation Tribunal, Government of Madhya Pradesh, Bhopal.
9.	Shri R.Chikkanna	Former Secretary, PWD, Government of Karnataka, Bangalore.
10.	Shri A. Mohana Krishnan	Chairman, Cauvery Technical Cell, Government of Tamil Nadu, Madras.
11.	Shri R.K. Patil	Centre for Applied System Analysis in Development (SASAD), Bombay

Annexure – 1.5 (para 1.1)

Statewise and Planwise details of Outlay/Expenditure for Major and Medium Irrigation Sector

(Re. Crores)

SI. No.	State/U.T.	First Plan (1951-56)	Second Plan (1936-61)	Third Plan (1961-66)	Annual Plans (1966-69)	Fourth Plan (1969-74)	Fifth Plan (1974-78)	Annual Plans (1978-80)	Sixth Plan (1980-85)	Seventh Plan (1985-90)
1.	Andhra Pradesh	37.47	57.43	91.52	60.87	118.71	269.11	257.69	729.59	1272.37
2.	Arunachal Pradesh	--	--	--	--	--	--	--	--	1.13
3.	Assam	--	1.02	1.43	1.89	3.97	24.83	15.62	68.91	116.06
4.	Bihar	15.55	26.54	68.12	33.96	130.46	203.93	164.47	719.19	1332.54
3.	Goa	--	--	Included	U.ts	--	--	Included	U.ts	66.96
6.	Gujarat	44.72	12.41	46.02	47.86	125.91	236.07	194.21	727.08	998.49
7.	Haryana	--	Include	in Punja	10.54	63.87	111.36	9346	253.41	502.01
8.	Himachal Pradesh	--	--	--	--	--	1.50	4.13	6.16	9.14
9.	Jammu & Kashmir	2.18	0.98	1.61	0.43	6.62	24.49	17.67	54.36	71.55
10.	Karnataka	38.69	27.39	30.86	32.03	134.29	188.46	138.38	413.53	527.42
11.	Kerala	11.79	7.91	10.29	9.16	27.36	75.13	74.97	259.53	301.90
12.	Madhya Pradesh	8.69	30.10	36.95	20.50	77.61	198.36	183.80	666.68	1155.43
13.	Maharashtra	--	52.63	63.10	58.00	166.33	361.63	292.80	1187.17	1561.87
14.	Manipur	--	--	--	--	1.41	13.39	9.62	38.75	73.76
15.	Meghalaya	--	--	--	--	--	0.11	--	--	0.21
16.	Mizoram	--	--	--	--	--	--	--	--	0.42
17.	Nagaland	--	--	--	--	--	--	--	--	--

18.	Orissa	55.28	20.00	26.22	20.44	20.89	70.63	67.01	322.89	591.47
19.	Punjab	31.87	38.19	19.21	6.92	31.72	49.57	53.10	208.85	220.23
2e.	Rajasthan	31.03	23.30	72.19	33.62	119.19	176.02	114.20	379.10	470.61
21.	Sikkim	--	--	--	--	--	0.35	--	0.65	--
22.	Tamil Nadu	25.42	15.20	30.86	12.54	26.95	54.75	27.66	164.46	193.36
23.	Tripura	--	--	--	--	--	0.09	0.87	16.49	30.87
24.	Uttar Pradesh	28.41	25.12	55.07	46.93	157.70	371.59	296.09	924.26	1245.01
25.	West Bengal	44.52	22.46	15.32	11.54	25.18	48.59	47.52	141.73	234.37
	Total for States	373.62	362.70	568.77	429.23	1240.17	2479.96	2054.15	7282.78	10979.12
	Total for U.Ts.	0.62	17.30	7.23	0.58	2.13	12.30	8.54	58.05	6.94
	Total States & U.Ts.	376.24	380.00	576.00	429.81	1242.30	2492.26	2062.69	7340.83	10986.06
	Central Sector	--	--	--	--	--	23.92	15.09	28.00	61.58
	Grand Total	376.24	380.00	576.00	429.81	1242.30	2516.18	2078.58	7368.83	11047.64

Source: Water and Related Statistics, CMC, April, 1972.

Remark: Figures are likely to undergo changes.

**Statewise and Planwise details of Outlay/Expenditure for
Minor Irrigation Sector (State Sector)**

(Rs. Crores)

S. N o.	State/U.Ts. No.	1st plan	IIInd plan	IIIrd plan	Annual plan	IVth plan	Vth plan	Annual plan	VIth plan	VIIth plan
		1951-56	1956-61	1961-66	1964-69	1969-74	1974-78	1978-79	1989-85	1985-90
1	2	3	4	5	6	7	8	9	10	11
1	Andhra Pradesh	--	7.10	29.19	16.77	19.01	23.33	22.42	78.18	176.94
2	Arunachal Pradesh	Included In U.Ts.			-					23.32
3	Assam		1.91	4.10	3.26	11.09	21.25	21.78	82.44	162.53
4	Bihar		8.27	12.68	31.40	41.25	61.40	38.74	291.45	34.13
5	Goa	Included In U.Ts.			-	-				8.80
6	Gujarat		18.78	13.44	19.43	30.03	45.87	25.74	118.82	199.78
7	Haryana	Included in Punjab			3.89	4.11	3.24	9.54	99.23	95.96
8	Himachal Pradesh		0.68	0.68	1.41	2.49	6.53	7.18	29.98	59.98
9	Jammu & Kashmir		0.99	1.06	4.79	7.91	12.10	11.44	49.18	62.69
10	Karnataka		10.27	37.05	24.13	34.79	41.40	31.60	99.37	172.70
11	Kerla		1.70	5.59	6.52	11.33	13.40	11.44	31.39	44.63
12	Madhya Pradesh		8.49	21.4	18.44	42.62	79.14	81.87	279.04	339.19
13	Maharashtra	Included in Gujarat		24.23	34.45	77.13	86.17	45.18	148.95	399.34
14	Manipur		0.05	0.07	0.04	0.34	1.72	2.53	6.87	8.71
15	Meghalaya	Included in Assam				0.94	0.74	1.50	6.10	10.14
16	Mizoram	-				.	.	-		6.84
17	Nagaland				0.25	0.58	1.72	2.44	19.34	14.42
18	Orissa		1.65	6.22	7.95	18.88	31.03	28.39	95.49	182.95
19	Punjab		4.87	8.08	7.95	14.48	14.28	3.35	19.69	34.94
20	Rajasthan		3.94	11.27	9.78	11.43	11.34	13.97	91.15	55.85
21	Sikkim				-	-	0.80	1.70	5.06	8.82
22	Tamil Nadu		6.32	22.98	30.47	33.46	24.39	19.44	49.94	199.28
23	Tripura		0.06	0.19	0.16	1.39	1.73	2.89	13.74	29.55
24	Uttar Pradesh		16.34	57.70	74.15	110.97	106.50	76.83	311.20	589.21
25	West Bengal		2.04	12.98	15.97	29.14	44.04	37.98	89.28	86.82
26	Total States	54.78	93.46	268.41	313.21	509.77	624.34	488.75	1882.34	3949.54
27	Union Territories		0.18	0.652	1.151	2.512	6.49	7.45	31.98	15.35
28	Total States U.T	54.78	93.64	269.062	314.361	512.282	639.03	494.29	1914.34	3944.91
29	Central Sector	11.84	48.59	58.67	11.83	-	-	5.30	44.92	151.00
30	Brand Total	65.62	142.23	327.732	324.191	512.282	439.81	591.59	1979.24	3215.91

Sources-Water and Related Statistics, April, 1992-CMC.

Remarks : Statewise breakup for First Plan is not available

* Figures are likely to undergo changes.

Annexure-1.6-8

Statewise and Planwise details of Outlay/Expenditure for Minor Irrigation Sector (Institutional)

(Rs. Crores)

S. No.	State/ U.T	First Plan	Second Plan	Third Plan	Annual Plans	Fourth Plan	Fifth Plan	Annual Plans	Sixth Plan	Seventh Plans 1985-90
		1951-56	1956-61	1961-66	1966-69	1969-74	1974-78	1978-80		
1	2	3	4	3	6	7	8	9	10	11
1	Andhra Pradesh		0.33	7.34	31.17	43.19	65.61	70.63	127.19	404.76
2.	Arunachal Pradesh		--	--	--	Included	in U.Ts.	--	--	--
3.	Assam		Neg.	Neg.	Neg.	1.12	0.78	0.58	7.77	36.68
4.	Bihar		0.01	0.37	9.29	41.95	67.21	34.62	111.40	127.01
9.	Goa		--	--	--	Included	in U.Ts.	--	--	--
6.	Gujarat		9.23	27.41	17.24	76.00	29.05	23.61	62.26	163.13
7.	Haryana		0.01	0.07	9.25	30.21	40.42	19.03	107.28	111.51
8.	Himaehal Pradseh		Neg.	Neg.	0.09	0.35	0.22	0.53	0.35	1.28
91.	Jamau & Kashmir		0.02	0.02	0.17	0.17	0.07	0.12	0.08	2.03
10.	Karnataka		1.55	4.15	13.94	36.29	55.04	13.05	58.08	295.82
11.	Kerala		0.37	1.61	1.35	9.85	17.75	17.63	27.55	93.08
12.	Madhya Pradesh		0.54	10.32	11.86	54.22	105.01	47.94	176.83	301.37
13.	Maharashtra		4.00	50.64	56.31	79.25	71.57	42.56	215.96	532.66
14.	Manipur			-	-		Neg.	-	--	
13.	Meghalya				-		Neg.	-	0.03	
16.	Mizoram		--	-	-	-	-	-		
17.	Nagaland		-	-	-	-	Neg.	-	--	--
18.	Orissa		0.13	0.45	2.10	16.15	44.94	33.99	47.43	35.20

19.	Punjab		0.61	3.40	19.28	49.90	37.74	22.12	132.39	154.06
20.	Rajasthan		0.14	0.66	4.69	19.56	29.92	29.35	76.61	128.15
21.	Sikkim							-	-	
22.	Tamil Nadu		2.33	4.76	24.83	96.86	38.32	9.72	15.35	174.31
23.	Tripura		-	-	-	0.02	0.10	0.06	0.23	
24.	Uttar Pradesh		0.05	4.05	32.38	95.77	144.94	79.33	237.78	423.26
25.	West Bengal		0.01	0.01	0.62	9.75	30.37	33.68	32.86	76.97
	Total States		19.35	115.26	234.63	660.61	778.36	478.73	1437.43	3060.38
	Total U.Ts.		Neg.	0.11	0.09	0.45	0.39	1.65	0.13	3.44
	Grand Total		19.33	115.37	234.74	661.06	778.75	480.40	1437.36	3063.82

Source: Mater and Related Statistics April, 1992. CWC

* Figure are likely to undergo changes.

Note: Statewise breakup for First Plan is not available.

Annexure 1.7-A (Part 1 of 2)
(Para 1.1)

**Statewise & Planwise details of Achievements of Irrigation Potential
Created and Utilized-Major & Medium Irrigation.**

(Thousand Hectares)

S. No.	State/UTs.	Ultimate Potential	Pre-Plan upto 1951	First-Plan 1951-56		Second-Plan 1956-61		Third-Plan 1961-66		Annual-Plans 1966-69		Fourth-Plan 1969-74	
			P/U	P	U	P	U	P	U	P	U	P	U
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Andhra Pradesh	5000	1676	77	59	181	129	368	91	78	359	199	217
2	Arunachal Pradesh	-	-	-	-	-	-
3	Assam	970								20	6	13	6
4	Bihar	6500	404	125	87	269	180	239	248	259	160	569	157
5	Goa			-	-	-	-	-	-	-	-	-	-
6	Gujarat	3000	33	64	25	185	41	92	126	99	129	182	89
7	Haryana	3000	436	-	-	-	-	864	818	56	78	173	159
8	Himachal Pradesh	50	-	-	-	-		-	-	-	-	-	-
9	Jammu & Kashmir	250	43	2	2	2	1	10	5	6	11	21	19
10	Karnataka	2500	308	48	21	140	97	177	156	132	57	42	79
11	Kerala	1000	158	93	61	49	81	15	15	23	23	41	41
12	Madhya Pradesh	6000	513	4	4	30	21	208	32	187	115	45	111
13	Maharashtra	4200	255	21	17	47	21	129	85	119	32	266	77
14	Manipur	135	-	-	-	-	-	-	-	-	-	-	-
15	Meghalaya	20											

S. No.	State/UTs.	Ultimate Potential	Pre-Plan upto 1951	First-Plan 1951-56		Second-Plan 1956-61		Third-Plan 1961-66		Annual-Plans 1966-69		Fourth-Plan 1969-74	
			P/U	P	U	P	U	P	U	P	U	P	U
1	2	3	4	5	6	7	8	9	10	11	12	13	14
16	Mizoram @	-	-	.	-	-	.	.					
17	Nagaland	10	~		—	"	~	"	"				
18	Orissa	3600	455	4	4	363	280	127	129	131	147	59	113
19	Punjab	3600	1220	1238	576	100	375	-658	-301	60	74	184	196
20	Rajasthan	2750	320	197	105	30	62	234	249	235	297	151	160
21	Sikkim	20	-	-	-	-	-	-		-	-	-	
22	Tamil Nadu	1500	891	125	193	125	125	22	39	-65	-72	30	47
23	Tripura	100	-	-	-	-	-	-	-	-	-	-	-
24	Uttar Pradesh	12500	2553	329	129	272	319	311	340	142	100	497	343
25	West Bengal	2310	440	159	87	359	336	93	199	48	88	135	118
	Total States	58315	9705	2486	1280	2143	2067	2231	2123	1530	1576	2598	1927
	Total U.Ts.	160	-	-	-	-	-	-	-	-	10	10	10
	Grand Total	58475	9765	2486	1280	2143	2067	2231	2123	1530	1576	2608	1937

Contd...

ANNEXURE 1.7-A (part 2 of 2)

Statewise & Planwise details of Achievements of Irrigation Potential Created and Utilised-Major & Medium Irrigation

(Thousand Hectares)

S. No.	State/UTs.	Ultimate Potential	Fifth-Plan 1974-78		Annual-Plans 1978-80		Sixth-Plans 1980-85		Total upto the end of Sixth Plan including preplan		Seventh Plan 1985-90 (Anticipated)	
			P	U	P	U	P	U	P	U	P	U
1	2	3	15	16	17	18	19	20	21	22	23	24
1.	Andhra Pradesh	5000	213	175	154	149	305	160	3242	3006	169	166
2.	Arunachal Pradesh		-	-	-	-		-	0	0	0	0
3.	Assam	970	28	19	28	18	12	18	101	57	85	57
4.	Bihar	6500	437	319	150	165	427	455	2879	2173	267	390
5.	Goa		-	-	-	-	-	-	0	0	9	6
6.	Gujarat	3000	302	100	73	28	64	134	1094	696	178	197
7.	Haryana	3000	181	35	59	1 04	154	1 15	1923	1745	160	66
8.	Himachal Pradesh	50		-	-	-	6	4	6	4	2	0
9.	Jammu & Kashmir	250	16	12	6	6	31	16	137	114	17	18
10	Karnataka	2500	161	235	66	29	179	60	1253	1112	162	212
11	Kerala	1000	53	31	26	28	77	77	535	515	60	60
12	Madhya Pradesh	6000	269	210	186	37	381	273	1823	1316	373	245
13	Maharashtra	4100	286	163	112	35	458	343	1693	958	245	209
14	Manipur	135	-	-	6	6	34	18	40	24	21	73
15	Meghalaya	20	-	-	-	-	-	-	0	0	0	0
16	Mizoram	10	-	-	-	-	-	-	0	0	0	0
17.	Nagaland	10	-	-	-	-	-	-	0	0	0	0
18	Orissa	3600	187	198	100	100	127	82	1553	1508	98	40
19	Punjab	3000	109	108	56	56	154	144	2463	2448	170	75

S. No.	State/UTs.	Ultimate Potential	Fifth-Plan 1974-78		Annual-Plans 1978-80		Sixth-Plans 1980-85		Total upto the end of Sixth Plan including preplan		Seventh Plan 1985-90 (Anticipated)	
			P	U	P	U	P	U	P	U	P	U
1	2	3	15	16	17	18	19	20	21	22	23	24
20	Rajasthan	2750	159	72	209	168	260		1795	1423	173	209
21.	Sikkim	20	-	-	-	-	-	-	0	0	0	0
22	Tamil Nadu	1500	50	41	1	5	65	60	1244	1225	46	41
23.	Tripura	100	-	-	-	-	-		0	0	4	4
24	Uttar Pradesh	12500	1368	535	557	542	604	576	6633	5517	533	451
25	West Bengal	2310	195	222	106	6	53	64	1579	1470	122	91
	Total States	58315	4014	2475	1895	1482	3391	2680	29993	25315	2896	2560
	Total U.Ts.	160	-	-	-	-	10	5	20	15	2	2
	Grand Total 58475		4014	2475	1895	1482	3401	2685	30013	25330	2898	2562

Source : Water and Related statistics, April, 1992-CWC.

P = Potential Created

U = Utilisation

@ = included under UTs

(Thousand Hectares)

Sl. No	Name of the State	Ultimate Potential	Pre-Plan 1950-51	At the end of IInd plan 1960-61	At the end of A. Plan 1968-69	At the end of IVth plan 1973-74	At the end of Vth plan 1977-78	At the end of Annual plan 1979-80	At the end of VIth Plan 1984-85		At the end of Seventh Plan 1985-90	
			P/U	P/U	P/U	P/U	P/U	P/U	P	U	P	U
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Andhra Pradesh	2300.0	753.00	753.00	756.00	775.00	980.00	940.00	1112.0	996.0	1253.00	1888.00
2.	Arunachal Pradesh	150.00	-	Included in Uts.		.	.	-	40.20	34.20	55.98	49.65
3.	Assam	1000.00	230.00	232.00	235.00	265.00	220.00	250.00	348.00	283.00	378.89	329.80
4.	Bihar	1900.00	850.00	853.00	856.00	875.00	890.00	725.00	1180	1075	1358	1218
5.	Goa	25.00	-	Included	In Uts.	-	.	-	13.60	13.35	15.51	14.75
4.	Gujarat	347.00	60.00	63.00	65.00	78.00	95.00	112.00	150.00	132.00	180.95	146.90
7.	Haryana	58.00	5.00	6.00	8.00	20.00	25.00	28.00	39.00	34.00	39.00	34.00
8.	Himachal Pradesh	235.00	60.00	62.00	63.00	75.00	85.00	90.00	106.00	97.00	1113.00	103.75
9.	Jamu & Kashmir	400.00	270.00	273.00	275.00	290.00	294.00	308	331.00	322.00	349.30	339.40
10.	Karnataka	900.00	425.00	428.00	431.00	460.00	550.00	595	676.00	654.00	713.44	691.44
11.	Kerala	800.00	23S.M	22B.00	230.00	265.00	275.00	290	340	320	389.90	362.35
12.	Madhya Pradesh	2200.00	400.00	403.00	406.00	425.00	500.00	568	813.00	728.00	941.70	847.00
13.	Maharashtra	1200.00	370.00	372.00	375.00	400.00	490.00	537	743.00	609.00	847.00	669.00
14.	Manipur	100.00	5.00	6.00	8.00	18.00	20.00	26.20	39.00	34.00	46.75	39.40
15.	Meghalaya	85.00	7.00	8.00	9.00	10.00	24.00	17.60	26.00	23.00	31.35	26.55
16.	Mizoram	70.00	-	included in Uts.		.	.	-	6.44	5.84	9.49	8.22
17.	Nagaland	75.00	-	6.00	10.00	35.00	35.00	42.00	51.00	47.00	62.05	54.00
18.	Orissa	1000.00	280.00	283.00	288.00	310.00	340.00	375	553.00	517.00	586.27	542.30
19.	Punjab	50.00	14.00	15.00	17.00	25.00	30.00	34	34.00	34.00	42.85	42.10
20.	Rajasthan	600.00	275.00	278.00	281.00	300.00	310.00	322	372.00	355.00	409.00	384.05
21.	Sikkim	50.00	N.A.	N. A.	N.A.	N.A.	7.00	9.00	14.00	10.00	20.36	15.85
22.	Tamil Nadu	1200.00	750.00	753.00	756.00	780.00	790.00	797	810.00	898.00	841.67	837.95
23.	Tripura	100.00	10.00	11.00	15.00	25.00	38.00	33.90	46.00	41.00	63.83	59.28
24.	Uttar Pradesh	1200.00	600.00	605.00	608.00	650.00	675.00	710	851.00	822.00	991.00	933.00
25.	West Bengal	1300.00	800.00	805.00	808.00	850.00	900.00	945	1030.00	1002.00	1224.75	1113.00
	Total States	17337.00	6391.00	6443.00	6500.00	6931.00	7465.00	7954.70	9683.24	8996.39	10965.84	9951.04
	Total U.Ts.	41.00	10.00	11.00	11.50	31.00	35.00	45.00	14.20	13.94	20.37	16.71
	Grand Total	17378.00	6401.00	6454.00	6511.50	6962.00	7500.00	7999.70	9697.44	9810.33	10986.21	9967.75

Source : Water and Related Statistics, April, 1992 – CWC. Remarks :

B : Due to revision of base level

P ; Potential Created

U : Potential Utilised

N.A. : Not Available

**Statewise and Planwise of details of Irrigation Potential Created and Utilised (Cumulative) under
minor Irrigation (Ground Water)**

(Thousand Hectares)

SI No	Name of The State	Ultimate Potential	Pre-Plan	At the end of IInd Plan	At the end of A. Plan	At the end of IVth Plan	At the end of Vth Plan	At the end of Annual Plan	At the end of VIth Plan		At the end of Seventh Plan	
									1950-51	1960-61	1968-69	1973-74
			P/V	P/U	P/U	P/U	P/U	P/U	P	U	P	U
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Andhra Pradesh	2200.00	310.00	425.00	620.00	775.00	980.00	1045.00	1229.00	1200.00	1544.00	1507.00
2.	Arunchal Pradesh	B	-	-	-	-	-	-	-	-	-	-
3.	Assam	700.00	Neg.	Neg.	1.00	2.00	28.00	38.00	83.00	66.00	158.15	109.07
4.	Bihar	4000.00	170.00	260.00	500.00	800.00	1210.00	1410.00	2232	2070	3070.00	2773
5.	Got	B	-	-	-	-	-	-	0.70	0.25	1.64	1.26
6.	Gujarat	1500.00	380.00	620.00	1000.00	1200.00	1260.00	1319.00	1524.00	1477.00	1669.00	1626.31
7.	Haryana	1500.00	275.00	300.00	550.00	1010.00	1150.00	1229.00	1348.00	1327	1448.97	1420.92
8.	Himachal Pradesh	50.00	Neg.	Neg.	Neg.	5.00	6.00	6.50	11.00	8.00	12.80	8.92
9.	Jamu & Kashamir	150.00	Neg.	Neg.	1.00	2.00	4.00	5	6.00	5.00	6.97	6.77
10	Karnataka	1200.00	120.00	150.00	310.00	325.00	375.00	420	472.00	461.00	642.00	626.00
11	Kerala	300.00	Neg	Neg.	3.00	5.00	10.00	20	50.00	45.0	89.48	74.92
12	Madhya Pradesh	3000.00	250.00	330.00	485.00	700.00	900.00	982	1179.00	1142.00	1439.70	1400.20
13	Maharashtra	2000.00	440.00	680.00	850.00	925.00	1025.00	1095	1255	1223	1547.10	1495.10
14	Manipur	5.00 a	-	-	-	Neg.	Nig.	0.10	Neg.	Neg.	0.12	0.12
15	Meghalaya	15.00 a	-	-	-	Neg.	4.00	6.10	9.00	9.00	9.00	9.08
16	Mizoram	b	-	-	-	Neg.	Neg.	-	-	-	-	-
17	Nagaland	5.00 a	-	-	-	Neg.	Neg.	Neg	Neg	Neg	0.68	0.43
18	Orissa	1500.00	Neg.	Neg.	3.00	90.00	180.00	290	507.00	463.00	569.90	517.26
19	Punjab	3500.00	800.00	900.00	1600.00	2600.00	2800.00	2880	3140.00	3105.00	3209.89	3160.29
20	Rajasthan	2000.00	950.00	1020.00	1250.00	1400.00	1450.00	1490	1615.00	1582.00	1854.14	1819.24
21	Sikkim	2.00 a	-	-	-	Neg.	Neg.	Neg.	Neg.	Neg.	-	-
22	Tamil Nadu	1500.00	500.00	765.00	950.00	1000.00	1050.00	1090	1140.00	1135.00	1216.72	1211.35
23	Tripura	15.00 a	Neg.	Neg.	Neg.	2.00	3.00	4.50	12.00	9.00	16.71	13.24
24.	Uttar Pradesh	12000.00	2300.00	2800.00	4200.00	5300.00	6915.00	8130	11280.00	10255.00	15651.00	14249.00
25.	West Bengal	2500.00	Neg.	Neg.	120.00	250.00	400.00	485	672.00	598.00	1399.05	1062.00
	Total States	39642.00	6495.00	8270.00	12470.00	16391.00	19750.00	21945.20	27764.70	26180.25	35558.27	33091.50
	Total U.Ts	120.00	5.00	7.00	38.00	47.00	50.00	55.00	57.98	57.61	60.94	60.42
	Grand Total	39762.00	6500.00	8277.00	12508.00	16438.00	19800.00	22000.00	27822.68	26237.86	35619.21	33151.92

Source: Water and Related Statistics, April, 1992 -CWC.

Remarks : Figures are Estimated and Provisional Estimates are only Partial and Under Revision

P : Potential Created

U : Potential Utilised

Neg.: Negligible

B :Included in Union Territories upto 79-81

(Thousand Hectares)

SI No	Name of the State	Ultimate Potential	Pre-Plan	At the end of IInd Plan	At the end of A.Plan	At the end of IVth Plan	At the end of Vth Plan	At the end of Annual Plan	At the end of VIth Plan		At the end of Seventh Plan	
			1950-51	1960-61	1968-69	1973-74	1977-78	1979-80	1984-85		(1985-90)	
			P/V	P/U	P/U	P/U	P/U	P/U	P	U	P	U
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Andhra Pradesh	4500.00	1060.00	1178.00	1376.00	1550.00	1880.00	1985.00	2341.00	2196.00	2797.00	2595.00
2.	Arunchal Pradesh	150.00	-	-	Included In Uts.			-	40.20	34.20	55.98	49.65
3.	Assam	1700.00	230.00	232.00	236.00	267.00	248.00	288.00	391.00	349.00	537.04	438.87
4.	Bihar	5900.00	1020.00	1113.00	1356.00	1675.00	2100.00	2335.00	3412.00	3145.00	4428.00	3991.00
5.	Goa	25.00	-	-	Included in Uts.			-	14.30	13.60	17.15	16.01
6.	Gujarat	1847.00	440.00	683.00	1065.00	1278.00	1355.00	1431.00	1674.00	1609.00	1850.32	1773.21
7.	Haryana	1550.00	280.00	306.00	558.00	1830.00	1175.00	1257.00	1387.00	1361.00	1487.97	1454.92
8.	Himachal Pradesh	285.00	60.00	62.00	63.00	80.00	91.00	96.50	117.00	105.00	126.60	112.67
9.	Jamu & Kashamir	550.00	270.00	273.00	276.00	292.00	298.00	313.00	337.00	327.00	356.27	346.17
10	Karnataka	2100.00	545.00	578.00	741.00	785.00	925.00	1015.00	1148.00	1115.00	1355.44	1317.44
11	Kerala	1100.00	225.00	228.00	233.00	270.00	285.00	310.00	390.00	365.00	479.00	437.00
12	Madhya Pradesh	5200.00	650.00	733.00	891.00	1125.00	1400.00	1550.00	1992.00	1870.00	2381.40	2247.20
13	Maharashtra	3200.00	810.00	1052.00	1225.00	1325.00	1505.00	1632.00	1997.00	1832.00	2394.10	2164.60
14	Manipur	105.00	5.00	6.00	8.00	18.00	20.00	26.30	39.00	34.00	46.87	39.52
15	Meghalaya	100.00	7.00	8.00	9.00	10.00	18.00	23.70	35.00	32.00	40.43	35.63
16	Mizoram	70.00	-	-	Included in UTs			-	6.44	5.84	9.49	8.22
17	Nagaland	80.00	5.00	6.00	10.00	35.00	35.00	42.00	51.00	47.00	62.73	54.43
18	Orissa	2500.00	280.00	283.00	318.00	400.00	520.00	665.00	1060.00	980.00	1156.00	1059.00
19	Punjab	3500.00	814.00	915.00	1617.00	2625	2830.00	2914.00	3174.00	3139.00	3252.00	3202.39
20	Rajasthan	2600.00	1225.00	1298.00	1531.00	1700.00	1760.00	1812.00	1987.00	1937.00	2263.00	2203.29
21	Sikkim	52.00	N.A.	N.A.	N.A.	N.A.	7.00	9.00	14.00	10.00	20.36	15.85
22	Tamil Nadu	2700.00	1250.00	1538.00	1706.00	1780.00	1840.00	1887.00	1950.00	1943.00	2058.39	2049.00
23	Tripura	115.00	10.00	11.00	15.00	27.00	33.00	38.40	58.00	50.00	80.54	72.52
24.	Uttar Pradesh	13200.00	2900.00	3405.00	4808.00	5950.00	7590.00	8840.00	12131.00	11077.00	16642.00	15182.00
25.	West Bengal	3800.00	800.00	805.00	928.00	1100.00	1300.00	1430.00	1702.00	1600.00	2624.00	2175.00
	Total States	56979	12886.00	14713.00	18970.00	23322.00	27215.00	29899.00	37447.94	35176.64	46524.11	43842.54
	Total U.Ts	161.00	15.00	18.00	49.50	78.00	85.00	100.00	72.18	71.55	81.31	77.13
	Grand Total	57140.00	12901.00	14731.00	19019.00	23400.00	27300.00	29999.90	37520.12	35248.19	46605.42	43119.67

Source: Ministry of Water Resources (Minor Irrigation division)

Remarks

P : Potential Created

U : Potential Utilised

N.A. : Not Applicable

Neg.: Negligible

Andhra Pradesh

The Water rates prevalent in Andhra Pradesh since 1.7.1986 are shown in Table-1.1.

TABLE-1.1 Water Rates (Rs./ha) for supply of water from Government sources* of irrigation in Andhra Pradesh with effect from 1.7.1986.

Nature of Crop	Water Rate (Rs./ha) for	
	Category - I** source	Category-II** source
1. For first or single wet crop	148.27	98.84
2. For second or third wet crop	222.40	148.27
3. For first irrigated dry crop	98.84	49.42
4. For second or third irrigated dry crop	148.27	74.14
5. For duffasal crop in the fasli year	370.67	247.11

Note * 1. A Government source of irrigation is one which has been shown as such in the settlement or resettlement classification.

** 2. Any source of irrigation coining under Major and Medium Irrigation Projects shall come under Category-I; sources other than Major or Medium Irrigation sources shall come under category-II.

Assam

No water rates are enforced in Assam

Bihar

The canals of Bihar are divided into the following two classes for imposition of water rates; (i) Perennial Canals and (ii) Non-Perennial Canals. Tables 3.1 and 3.2 show the rates for perennial and non-perennial canals prior to and since 1.10.1983.

1.	Kharif		
	(a) Long lease	74.13	
	(b) Season lease	77.84	89.45
	(c) Single watering	44.48	51.15
2.	Rabi		
	(a) Season lease	44.48	51.15
	(b) Single watering	40.77	46.95
3.	Hot Weather		
	(a) Season lease for sugarcane	137.14	157.65
	(b) Season lease for crops other than sugarcane	137.14	157.65
	(c) Season lease for Jute	40.77	46.95
	(d) Single watering for all crops other than Jute	48.18	55.35
4.	Single watering for sugarcane outside the hot weather reason lease.		55.35

TABLE: 3.2 Water Rates (Rs./ha) for Mon-Perennial Canals in Bihar

	From 1974 to September, 83	From 1.10.1983
1	2	3
1. Kharif		
a. Long lease	33.36	
b. Season lease	40.77	46.95
c. Single watering	25.95	29.90
2. Rabi		
a. Season lease	33.36	38.30
b. Single watering	25.95	29.90
3. Hot Weather		
a. Season lease for sugarcane	88.96	102.30
b. Season lease for crops other than sugarcane	88.96 S	102.30
c. Season lease for Jute	40.77	46.95
d. Single Watering for all crops other than Jute	29.65	34.10
4. Single watering for sugarcane outside the hot weather		46.75

the State Irrigation Department dated 10.4.81 and have been effective from 15.6.81. These are shown in Table-4.1.

TABLE: 4 - Water Rates in Gujarat with effect from 15.6.1981

Name of Season/Crop 1	Water Rates (Rs. per ha.) 2
(A) Kharif Season:	
1. Paddy	110.00
2. Kharif Paddy with water for Dharuvadria during one month before the season	125.00
3. Water Rates for Paddy in reclaimed Kharland areas :	
a. First and Second year	25.00
b. Third and Fourth year	40.00
c. Thereafter from the Fifth year	As (1) and (2) above
4. Crops like Bajri, Bavta, Juwar, Kodri, Maize and late Kharif Juwar	40.00
a. For every post-kharif additional watering sanctioned on canal form VI for maturity of crop	15.00
5. Deshi Kharif Juwar for Ukai-Kakrapar area (season 1st August to 31st Dec.) and Habrid Juwar	60.00
6. Other food crops and pulses not mentioned above, vegetables and grass	60.00
7. Groundnut, Cotton and Kharif crops other than those mentioned above	100.00
B. Rabi Season	
8. Wheat, Raydo	110.00
9. Crops like Channa and Val	50.00
10. Chenopodium (season 15th Nov. to 14th April)	125.00
11. Other Food Crops, Grass and Vegetables	100.00
12. Jeeru (cumin seeds) Varijoli (Fennel seeds) and Isabgol (Season 15th Nov. 14th April)	200.00
13. Other Rabi Crops not mentioned above	150.00
C. Hot Weather Crops	

16. Hot Weather groundnut and other hot weather crops not mentioned above. (season to be reckoned if necessary from 15th Jan to 14th May for Hot Weather groundnut)	200.00
D. Two seasonal crops	
17 Crops like cotton and bidi tobacco –is	200.00
Breakup for Kharif	75.00
Rabi	125.00
18. All other varieties of tobacco except bidi tabacco	250.00
Breakup for Kharif	100.00
Rabi	150.00
E. Perennial Crops:	
19. Sugar-Cane (12 months) and Plantains	830.00
Breakup for Kharif	170.00
Rabi	290.00
Hot Weather	370.00
20. Rajko (Gadab) and other Perennial Crops (12 months not mentioned above)	570.00
Breakup for Kharif	120.00
Rabi	200.00
Hot Weather	250.00

Note:

1. Additional watering for bringing, seasonal crops to maturity after the end of the season and pre-seasonal watering for ploughing purpose, provided separate sanction is obtained on canal Form-VI (Such single watering will not be allowed on water applications sanctioned at breakup rates. 30.00
2. Independent single watering for any season and crops (subject to the conditions mentioned in G.R. dated 10.3.76) 50% rate for respective season and crops.
3. Green manure Rs.25/- per season
4. Water supply for leading Khar-lands and coastal saline lands in Kharif season if surplus water is available Free of charge
5. For supply of water for food and fodder crops during testing period of canals of major and medium projects 50% of the sanctioned rate for the first year

- | | | |
|----|---|---|
| 6. | Water rates for lift irrigation done by irrigators at their own cost : | |
| A. | Lift irrigation from storage or pickup weir schemes of notified rivers, upto five miles upstream | 1/3 of the above sanctioned rate for flow irrigation |
| B. | Lift irrigation from canals of v irrigation projects | 1/2 of the above sanctioned rate for flow irrigation |
| C. | Lift irrigation from river between storage reservoir and pickup weir | 1/3 of the above sanctioned rate for flow irrigation |
| D. | Lift irrigation done from notified rivers, down stream of storage or pickup weir | Free of charge.
(However, prior permission from the Competent authority should be obtained as per rules) |
| E. | Lift irrigation done from the lift irrigation schemes to be taken up by G.W.R.D.C. in Ukai-Kakrapar area | 80 paise per 10,000 litres |
| 7. | Water rate applicable to water co-operative societies. Water rate for flow irrigation for water co-operative societies formed by the irrigators in command area of irrigation projects. | 25 paise for 10,000 litres |
| 8. | Perennial blocks on Kakrapar scheme as decided under G.R. No. CME-1072/4/P. dated 5.10.73. | Rate per hec. and per annum |
| | 1 : 3 blocks | Rs.330.00 |
| | 1 : 4 blocks | Rs.280.00 |
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Table - 5.1.

TABLE 5.1. Schedule of water rates (Rs./ha) in Haryana with effect from Kharif 1975.

A. Water rates for the purpose of Irrigation from all canals except Lower Chautang Nala Canal

Class	Crop	Rates for irrigation flow (Rs./ha)	
		Bhakra Canal including Ghaggar and Saraswati Canals	Western Jamuna canal, Gurgaon Canal, Revari, Jui, Indira Gandhi Canal (Now Loharu canals) and Bisendra Narayan Chakravati (Sewani) Canal
1	2	3	4
1.	Sugarcane (except on Kharif channels)	98.84	84.01
2.	Sugarcane on Kharif channels	81.54	81.54
3.	Waternuts	81.54	81.54
4.	Rice	74.13	74.13
5.	Indigo and other dyes tobacco poppy, spices and drugs.	61.78	61.78
6.	Cotton	61.78	61.78
7.	Gardens and orchards and Vegetables except turnips	61.78	61.78
8.	Barley and oats (except on Kharif Channels)	66.72	46.50
9.	Wheat (except on Kharif Channels)	61.78	44.48
10.	Melon, Fibres (other than cotton and all crops not otherwise specified)	56.83	56.83
11.	Maize	49.42	49.42
12.	Oil Seeds (except rabi oil seeds on Kharif channels	49.42 5	49.42
13.	Oil seeds Rabi crop	66.72	46.50
14.	All Rabi Crops on Kharif channels except wheat and gram	32.12	22.24
15.	Wheat on Kharif channels	22.24	10.55

turnips			
19. Watering for ploughing not followed by a crop in the same or succeeding harvest	7.41		
20. Village and Zila Parishad and Panchayat Samities Plantations			
i. any number of waterings in Kharif	12.36	12.36	
ii. one watering in Rabi	12.36	9.88	
iii. two or more waterings in Rabi	24.71	17.30	
21. Grass			
i. Single watering in Kharif	12.36	12.36	
ii. Single watering in Rabi	12.36	9.88	

		Flow	Lift Maintained and operated by cultivators
(1)	(2)	(3)	(4)
1.	Sugarcane, rice and waternuts	49.42	32.12
2.	Cotton, Indigo & Maize	29.65	19.77
3.	Other Kharif crops	19.77	12.36
4.	Special rates-single watering before ploughing for Rabi except wheat and gram followed by a crop	12.36	7.41
5.	Special rates-single watering before ploughing for wheat and gram followed by a crop	12.36	7.41
Note:	Additional watering after 31st October		
	1 Per ha all crops except fodder crop including turnip	9.88	7.41
	2. For fodder crops including turnips	4.94	3.71

Notes :

1. Rates for lift irrigation maintained and operated by the cultivators are half the flow irrigation rates shown above for all canals. For Jhujjar and JLN Lift Irrigation Schemes the rates are half the rates given in Col. (4) above.
2. Grass given two or more waterings falls under class 18.
3. Hempo, Indigo, Guara, Jantar and Arhar Ploughed in as green manure before 15th September are not assessable to water rates.
4. Rates are per crop except for garden and orchards which are per half year.

8.11.1977 are shown in Table - 6.1.

TABLE 6.1: Occupiers Rates (Rs./Ha) for Minor Irrigation with effect from 8.11.1977 in Himachal Pradesh

	Nature of crop	Rates Flow	(Rs./Ha) Lift	
	(1)	(2)	(3)	
1.	(a) Sugarcane (on Kharif Channels)	33.61	67.21	per crop
	(b) Sugarcane (except on Kharif Channels)	41.09	82.19	per crop
2.	Water nuts	28.02	56.04	per crop
3.	Indigo & other dyes, tobacco, poppy, spices and drugs	20.53	41.02	per crop
4.	Rice	24.27	48.53	per crop
5.	Cotton	16.80	33.61	per crop
6.	Melons, fibre (other than cotton and all crops not otherwise specified)	16.80	33.61	per crop
7.	Maize	13.96	27.92	per crop
8.	Kharif oilseeds	15.86	31.73	per crop
9.	Barley & oats (except on Kharif channels)	15.86	31.73	per crop
10.	Garden and orchards (excluding rabi crops) and vegetables	20.51	41.02	Garden and orchards per half year and rest per crop
11.	All rabi crops (except wheat & grams) including garden, orchards & vegetables	7.54	15.07	- do -
12.	Wheat and grams (on Kharif channels)	6.87	13.96	per crop
13.	Wheat and grams (except on Kharif channels)	14.58	29.16	per crop
14.	Bajra, Masoor and Pulses	12.13	24.27	per crop
15.	Grams	11.12	22.24	per crop
16.	Jawar, choons, grass which has received two or more waterings and all fodder crops including turnips.	9.34	18.68	grass per half year & the rest per crop
17.	Grass single watering	3.73	7.46	per half year
18.	Watering for ploughing not followed by crops in same or succeeding harvests.	3.73	7.46	per half year

	(1)	(2)	(3)	
20.	Paddock area as sanctioned by the local government	20.39	40.77	per half year in whole area irrespective of whether it be irrigated in part or whole or not at all
21.	One watering in Kharif	3.73	7.46	per half year
22.	One watering in Rabi	3.73	7.46	- do -
23.	Two or more waterings in Kharif or Rabi (General rate)	7.54	15.07	- do -
24.	Wheat	14.58	29.16	per crop
25.	Brick making and pise wall building	0.74	1.48	per hundred cubic feet
26.	Laying concrete brick or stone Masonaroy	0.49	0.99	- do -
27.	Metalling road	37.07	74.13	per mile
28.	Consolidation of kacha service road	111.20	222.40	per mile per annum for max. 8 waterings in 10 months Dec.- Sept.
29.	Water supplied in bulk	3.71	7.41	per 2500 cubic feet
30.	Watering roadside avenue trees	9.27	18.53	Rs. 7.50 per canal mile of 5000 ft. for kharif crop, Rs. 15 per canal mile of 5000 ft. for rabi crops.
31.	Sprinkling water on roads in the Knar if season	18.53	37.07	per mile
32.	Sprinkling water on roads in the rabi season	37.07	74.13	per mile
33.	Opium	67.21	134.43	per crop

TABLE - 7.1: Water Rates (Rs./Ha) in Jammu & Kashmir with effect from 1-4-1976.

S. No.	Name of the Crops	Water Rates (Rs./ha)
(1)	(2)	(3)
A.	Jammu Division	
	Gravity Schemes	
1.	Sugarcane	20.07
2.	Paddy	20.07
3.	Vegetable	32.36
4.	Shaftala	15.44
5.	Maize	7.71
6.	Pulses	7.71
7.	Other crops	-
8.	Oil Seeds	10.80
9.	Wheat	10.80
10.	Plantation & Nurser	3.85
11.	Rouni	1.53
	Stabilization	
1.	Paddy	
2.	Vegetables	
3.	Maize	
4.	Other crops	6.18
5.	Wheat	
6.	Oil Seeds	
7.	Rouni	
	Lift/Pump Canals	
1.	Paddy	102.80
2.	Sugarcane	289.12
3.	Maize	25.70
4.	Vegetables	64.25
5.	Other Crops	-
6.	Wheat	51.40
7.	Oil Seeds	22.12

12.	Shaftala	51.40
13.	Wadwatter	9.64
B. Kashmir Division		
Gravity Schemes		
1.	First Class Crop (Paddy)	16.30
2.	Second Class Crops (Maize, Vegetables Alsi Etc.)	8.15
3.	Jallar and Jatta	4.20
4.	Stabilization (Abi Awal and Abi Doom for all types of crops)	6-18
5.	Wad water	2.96
6.	Roomi	1.48
Lift Irrigation		
1.	Wet Crops	51.38
2.	Dry Crops	25.69

8 Karnataka

8.1 The revised normal water rates for different crops grown on the agricultural lands coming under the command of the Major and Medium Irrigation works in Karnataka with effect from 1.7.1985 are shown in Table - 8.1.

TABLE - 8.1: Water Rates (Rs/na) for Major and Medium Irrigation Works in Karnataka with effect from 1.7.1985

S.No.	Crop	Water Rate (Rs./Ha)
(1)	(2)	(3)
1.	Sugarcane to be harvested within 12 months	370.67
2.	Sugarcane to be harvested after 12 months but within 18 months	556.00
3.	Paddy	86.49 for the crop 98.84 for each of the II and subsequent crops
4.	Wheat	54.36
5.	Jowar	49.42
6.	Ground Nut	59.31

10.	Pulses	37.07
11.	Manorial crops	19.77
12.	Garden crop	98.84

8.2 For the period from 1.7.78 to 30.6.85, the water rates shall be levied and recovered at the rates in force from 1st July, 1976 in respect of lands under the Major and Medium Irrigation Projects for which the revised normal rates are now made applicable. These rates should be deemed to have been in force during the above period, for all purposes including booking of demand.

8.3 In respect of holdings coming under the Minor Irrigation Tanks, and such of the Medium Irrigation Projects which do not have assured supply of water, reduced water rates shall be levied in the following manner:

(i) Half the normal water rates will be levied on crops grown on lands coming under the command of the Medium Irrigation Projects with no assured supply of water. For this purpose, the Irrigation Department will prescribe the norms for classifying such types of projects and also specify the names of such projects. Such classification shall be subject to a review once in five years.

(ii) In respect of the minor irrigation tanks, as the supply of water is only of a supplemental nature and not to the full extent of the total water requirements of the crops reduced water rates will be levied on a differential basis as under:

(a) Higher reaches of the atchkat 1/2 the normal water rate, as comprising 2/3rds of the total at para (8.1) above, atchakat.

(b) Lower reaches including tail-end 1/4th the normal water rate lands, comprising 1/3rd of the as at para (8.1) above, total Atchkat

(iii) The water rates levied under (i) and (ii) above shall further be subject to a minimum of 1 1/2 times and a maximum of 2 times the "water share", the water share being the difference between the standard rates for wet and dry assessments as notified for the area, under the Land Revenue settlement for the time being in force.

The Government revised the rate of water cess in the entire State uniformly with effect from 1.7.1974 by amending the Acts applicable to erstwhile Travancore - Cochin area, Malabar area and South Canara district. The revised rates are shown in Table - 9.1.

TABLE - 9.1: Water Rates (Rs./ha) in Kerala with effect from 1.7.1974

S.No.	Type of land	Water Rates (Rs./ha)
1.	Lands already registered as single crop wet lands and on ~ which two paddy crops could be raised.	62
2.	Lands already registered as single crop wet lands and on which more than two paddy crops could be raised.	99
3.	Other lands already registered as wet lands on which two paddy crops could be raised.	62
4.	Other lands already registered as wet lands on which more than two paddy crops could be raised.	99
5.	Lands made fit for cultivation and on which only one paddy crop could be raised.	37
6.	Lands made fit for cultivation t and on which two paddy crops ' could be raised. ^ ^ ^ L	62
7.	Lands made fit for cultivation and on which more than two paddy crops could be raised	99
8.	Other lands benefitted	62
9.	In the case of Lift Irrigation Schemes the rate of cess is fixed as 50% in excess of the cess leviable for the area benefitted by major Irrigation Projects which are given above.	

No seasonwise water rates are fixed in Kerala. Irrigation cess is collected annually on the basis of gross area irrigated during the year.

TABLE - 10.1. Water Rates (Rs./ha) in Madhya Pradesh w.e.f. 1.10.84

S. No.	Name of Crops	Water Rate (Rs./ha)
1	2	3
1.	Rice	
	(a) Demand Rate	59.30
	(b) Long term agreement rate	54.36
2.	Wheat	
	(a) Preparing land for cultivation with maximum three waterings	61.78
	(b) For each additional watering	14.83
3	Sugarcane	296.52
4.	Sweet Potatoes, groundnuts (Kharif) field peas, soyabean, Sun hemp, mustard, garbeans, castor-oil plant:	44.48
5.	Cotton	
	(a) Ordinary	59.30
	(b) Hybrid, Vipul	92.66
6.	Garden crops such as chillies, brinjals, Potatoes, radish, cucumber, water melons, gourds, ladyfingers, arum, garlic, zira, methi, lettuce and other green vegetables, orchard and rubber plants, plantains, turmeric and pan.	296.52
7.	Poppy and tobacco.	66.72
8.	Bersum fodder	123.55
9.	Jowar	
	(a) Rabi ordinary	37.07
	(b) Rabi Hybrid, Vipul	74.13
	(c) Kharif ordinary	29.65
	(d) Kharif Hybrid, Vipul	37.07
10.	Clover, lucern and other fodder crops	123.55
11.	Green manuring crops (like sarin, Dhancha etc.)	14.83
12.	Groundnut (Rabi)	59.30
13.	Summer rice	222.39
14.	Grans, mung, and other Dals	42.01
15.	Barley (Rabi)	49.42
16.	Mulberry plants	123.55
17.	Sun flower	59.30
18.	Preparing land for cultivation for poughing etc.	29.65
19.	Corriander	123.55

Note : The rates are uniform throughout the state.

are given in tables 11.1 to 11.5 as under:

Table 11.1 (Water Rates Rs./ha)

S. No	Crop/Season	During 1 st year from 1-7-90	Perennial water supply from Major, Medium & Minor Irrigation Projects			
			During 2 nd year from 1-7-91	During 3 rd year from 1-7-92	During 4 th year from 1-7-93	During 5 th year from 1-7-94
1)	(2)	(3)	(4)	(5)	(6)	(7)

Kharif Season

1.	Kharif season (including HYV)	65.00	70.00	80.00	90.00	100.00
2.	Kharif Rice (Agreement)	65.00	70.00	80.00	90.00	100.00
3.	Kharif Rice (Demand)	120.00	40.00	160.00	180.00	200.00
4.	Kharif Ground Nut	120.00	140.00	160.00	180.00	200.00
5.	First Irr. (including Rabi crop during Kharif)	-	-	-	-	-
6.	HYV Seeds and During Kharif foundation crop	120.00	140.00	160.00	180.00	200.00

Rabi Crop

7.	Rabi Season (excluding Wheat and Ground Nut)	90.00	105.00	120.00	135.00	150.00
8.	Rabi Wheat	100.00	125.00	150.00	175.00	200.00
9.	Kharif Rabi Cotton	180.00	240.00	240.00	270.00	300.00
10.	Rabi Ground Nut	180.00	210.00	240.00	270.00	300.00
11.	Rabi & Summer Rice	180.00	210.00	240.00	270.00	300.00
12.	HYV Seeds & foundation Crop during Rabi	180.00	210.00	240.00	270.00	300.00
13.	Last Watering (Post seasonal Watering for Rabi Crops) Summer Seasonal Crop	30.00	35.00	40.00	45.00	50.00
14.	Summer Season	180.00	210.06	240.00	270.00	300.00
15.	Summer Ground Nut	375.00	420.00	500.00	500.00	600.00
16.	Summer Cotton (From 1st of April)	400.00	450.00	500.00	550.00	600.00
17.	Last Watering (Watering in Summer Season)	480.00	560.00	840.00	720.00	800.00
18.	Advance Water (One watering during	90.00	105.00	120.00	135.00	150.00

			year from 1-7-91	year from 1-7-92	year from 1-7-93	year from 1-7-94
1)	(2)	(3)	(4)	(5)	(6)	(7)
20.	Bi-Seasonal Crops					
20.	Bi -Seasonal (e.g. Toor & Potato etc.)					
	1. In between Kharif & Rabi	90.00	150.00	120.00	135.00	150.00
	2. In between Rabi & Summer season	150.00	175.00	200.00	225.00	250.00
	PERENNIAL					
21.	Sugarcane	1000.80	1250.00	1500.00	1750.00	1750.00
22.	Banana	800.00	1000.00	1250.00	1500.00	1750.00
23.	OTHER PERENNIAL					
	1. Fruit Tree, Bar lie. Grass etc	800.00	1000.00	1250.00	1500.00	1750.00
	2. Sugar — Beet (Excluding 1st & last Maturing)	195.00	220.00	245.00	275.00	300.00
	3. Vegetable during kharif	120.00	140.00	160.00	180.00	200.00
	4. Vegetable during Rabi	195.00	220.00	245.00	275.00	300.00
	5. Vegetable during Summer	355.00	440.00	545.00	654.00	750.00
	6. Onion during Kharif & Rabi	315.06	360.00	410.00	455.00	400.00
	7. Onion Last watering during Knarif & Rabi	345.00	395.00	445.00	500.00	500.00
	8. More than one watering to Onion during Knarif and Rabi & Summer Season crops	450.00	510.00	575.00	649.00	700.00
	9. Onion during Rabi & Summer Season	480.00	560.00	640.00	720.00	800.00
24.	Overlap					
	1. Upto December for each month					
	i Kharif	45.00	55.00	65.00	75.00	85.00
	ii Rabi (Additional watering)	80.00	95.00	110.00	125.00	135.00
	2. During January	200.00	250.00	300.00	350.00	350.00
	3. During February	220.00	275.00	325.00	380.00	380.00
	4. During March	375.00	170.00	565.00	660.00	660.00
	5. During April	465.00	555.00	700.00	820.00	820.00
	6. Upto beginning of February each month	80.00	95.00	100.00	125.00	145.00
	7. Beginning of March	235.00	355.00	430.00	500.00	500.00
	8. Beginning of April	330.00	450.00	495.00	580.00	580.00
	Block rate for group of Cross					
25.	Sugarcane Block 1:4	330.00	410.00	490.00	575.00	575.00
26.	Fruit Block	800.00	1000.00	1250.00	1503.00	1750.00
27.	Garden Block	370.00	450.00	530.00	610.00	680.00
28.	Garden Seasonal Block	390.00	470.00	555.00	640.00	730.00

			year from 1-7-91	year from 1-7-92	year from 1-7-93	year from 1-7-94
1)	(2)	(3)	(4)	(5)	(6)	(7)

Rate of Sewer Water use for Irrigation

32. Sugarcane	2500.00	2750.00	3000.00	3250.00	3250.00
33. Other Perennial Crops	1750.00	2000.00	2250.00	2500.00	2750.00
34. Kharif Season	160.00	170.00	180.00	190.00	200.00
35. Rabi Season	240.00	255.00	270.00	285.00	300.00
36. Wheat	323.00	350.00	375.00	400.00	425.00
37. Summer Crop	510.00	570.00	630.00	690.00	750.00
38. Rice	510.00	570.00	630.00	690.00	750.00
39. Cotton	810.00	870.00	930.00	990.00	1050.00
40. Groundnut	810.00	870.00	930.00	990.00	1050.00

Source: CWC letter No. 1 (2)/92-stat./142 dt. 25-02

Table: 11.2 (MAHARASHTRA)

(from pre page)

Cubic metre system/water taken from the reservoir constructed from the contribution/ownership rate

(Rs. per 1000 Cub)

S1. No.	Place	Season	During 1st year from 1-7-90	2nd year from 1-7-91	3rd year from 1-7--92	4th year from 1-7-93
1.	At the site of minor-irrigation scheme	Kharif	12	14	16	18
		Rabi	18	21	24	27
		Summer	38	42	43	34
2-	Canals	Kharif	13	15	18	20
		Rabi	20	23	26	29
		Summer	41	47	54	60
3-	Reservoir constructed from the contribution of the beneficiaries (Ownership rate)	For all Seasons	2	4	6	3

Notes : For the Cooperative Societies which are using water- from minor Irrigation Schemes if any fund is not offered for their management then.20% subsidy will be given immediately after paying the water cess.

(Rs/hac.)

S.No	Place from where water is lifted	Kind of crops				
		Sugarcane & Banana	Other perennial crop	Kharif Crop	Rabi Crop	Summer Crop
1.	Canal	750.00	500.00	50.00	75.00	150.00
2.	Reservoir	375.00	250.00	25.00	37.50	75.00
3	Dam or high Barrage	375.00	250.00	25.00	37.50	75.00
4.	High Barrage	375.00	250.00	25.00	37.50	75.00
5.	Area in the river bed	187.50	125.00	12.50	20.00	37.50
6.	Within back water zone of the barrage for which no water is released from an upstream storage	187.50	125.00	12.50	20.00	37.50
7.	Within back zone of the barrage for which water is released from an upstream storage	62.50	40.00	Nil	12.50	12.50
B.	Kharif barrage for stray water	62.50	40.00	Nil	12.50	12.50

(B) Water rate for irrigation obtained from kolhapur type barrage, lift irrigation from river, lift irrigation for sugarcane (including aftermath) (from mowing harvesting).

1. Dams upon notified rivers from which water is given for twelve months. 468.75 (Rs./Ha)
2. Kolhapur type barrages for which water is not released from upstream cams 235.00 (Rs./ha).
3. From the rivers not benefited from any stores. 75.00 (Rs./Ha)

SI. No.	Season /Crop	1st year from 1.7.1990	2nd year from 1.7.1991	3rd year- from 1.7.1992	4th year from 1.7.1993	5th year from 1.7.1994
1	2	3	4	5	6	7
(A) Two Seasonal Crop						
	1. Toor	120	140	160	180	200
	2. Tarmeric	165	190	220	250	275
	3. Chilli	165	190	220	250	275
	4. Long Fibre Cotton or Groundnut (Summer & Kharif)	300	350	400	450	500
(B) Perennial Crop						
	1. Sugarcane	825	1050	1275	1500	1500
	2. Banana	750	960	1140	1320	1500
	3. Other Perennial crops	540	665	790	915	1037
	4. One watering for overlapping Sugarcane & Banana	30	35	40	45	50
(C) Kharif Crop						
	1. Rice	90	105	120	135	150
	2. Cereal & Fodder Crops	75	87	100	112	125
	3. Other cash crops	105	122	140	158	175
(D) Rabi Crop						
	1. Wheat	135	158	180	202	225
	2. Other cereal & Fodder crop	90	105	120	135	150
	3. Other Cash Crops	210	245	280	315	350
(E) Summer- Crop						
	1. Summer Cereal crop	180	210	240	270	300
	2. Hybrid Jowar	180	210	240	270	300
	3. Cash Crop	300	350	400	450	500
	4. Second Summer Rice	225	262	300	337	375
(F) Vegetables						
	1. Kharif	135	158	180	202	225
	2. Rabi	210	245	280	315	350
	3. Summer	300	350	400	450	500
(G) Last 4 First Water (each watering)						
	1. Cereal crop	24	28	32	36	40
	2. Cash Crop	33	38	44	50	55

Note: Above rates are the service charges for lifting water. In addition to the rates of taking water from scheduled rivers, nalas, rivulets or canals be charged (as per the Annexure III) and will be sanctioned by the Govt. time to time.

SI- No	Season/Crop	1st year from 1.7.1990	2nd year from 1.7.1991	3rd year from 1.7.1992	4th year from 1.7.1993	5th year from 1.7.1994
1	2	3	4	5	6	7
(A)	Two Seasonal crop					
	1. Toor	143	153	164	1B5	205
	2. Turmeric	171	200	220	256	285
	3. Chilli	171	153	228	256	285
	4. Long Fibre cotton (Summer & Kharif)	360	420	480	540	600
(B)	Perennial Crop					
	1. Sugarcane	997	1369	1541	1812	1812
	2. Banana	942	1159	1426	1 690	1612
	3. Other perennial crop	656	807	958	1109	1262
	4. One watering for over	37	43	50	56	62
	Lapping Sugarcane & banana					
(C)	Kharif Crop					
	1. Rice	132	154	176	198	220
	2 Cereal & Fooder crop	75	37	100	112	1 25
	3. Other Cash crop	105	122	140	158	175
(D)	Rabi Crop					
	1. Wheat	165	190	220	250	275
	2. Other Cereal & Fodder crop	99	115	135	149	165
	3. Other cash crop	210	245	280	315	350
(E)	Summer Crop					
	1. Cash crop	360	420	480	540	600
	2. Second summer rice	414	483	552	621	690
(F)	Vegetable					
	1. Kharif	138	161	184	207	230
	2. Rabi	210	245	280	315	350
	3. Summer	360	430	480	540	600
(G)	First and Last watering (Each Watering)					
	1. Cereal crop	24	23	32	36	40
	2. Cash crop	33	3d	44	50	55

Note: Above rates are the service charges for lifting water In addition to these, the rates of taking water from scheduled rivers; halas, rivulets or canals shall be charged. (as per the Table 11.3) and will be sanctioned by the Government- from time to time.

TABLE - 12.1: Existing and proposed water rates in Manipur (Rs./ha)

Season	Name of crop	Existing Water- Rates	Proposed Water Rates
Kharif	Rice II	37.50	50.00
Rabi	Rice I	75.00	100.00
	Wheat	37.50	50.00
	Other Rabi Crops (Mung, Mustard, Peas etc.)	22.50	30.00

12.2 Notification for the enforcement of the present water rates was issued under Govt. of Manipur No. 4/4/IFC dated 23.12.81 for the levy of water rates in the State which is in exercise of the powers conferred by Section-100 of the Manipur Irrigation Act, 1977. Actual realisation of water rates has not yet been started in the State.

13 Meghalaya

There is no major or medium irrigation project in the State. AS such no water rates are enforced.

14 Mizoram

No water rates are enforced in Mizoram.

15. Orissa

15.1 Compulsory basic water rate is flat water rate per acre of land within the culturable command area of an irrigation work payable to the State Government for supply of water, whether used or not, from an irrigation work for irrigation of the staple cereal Crop generally grown in the area. The paddy crop which is harvested between the 16th day of October and the 31st day of January is the staple crop for the entire State of Orissa. Irrigation works are classified into 4 classes viz. Class I, Class II, Class III and Class IV according to their capacity to irrigate the lands. The water rates for staple cereal crops for different classes of irrigation works in various time periods are shown in may be table - 15.1 and 15.2.

TABLE - 15.1

Irrigation Rates for Staple Cereal Crops in Orissa

S. No.	Class of Irrigation work	Depth of supply in inches to be guarantee teed	Irrigation Rates (Rs./ha) for flow irrigation					
			61-62	68-69	73-74	74- 75	75-74	81-82 onwards
1	2	3	4	5	6	7	8	9
1.	Class I	28"	19.77	9.88	9.88	9.88	19.77	39.54
2.	Class II	23"	14.83	7.41	7.41	7.41	14.83	29.65

rate/water rate will be levied for the first time, the following principles shall be adopted:

- a) In the first year when the water is let out in the Ayacut Nil
- b) In the 2nd year when water is let out in the Ayacut 50% of the appropriate rate
- c) In the 3rd year when water is let out 75% of the appropriate rate
- d) In the 4th year and thereafter let out in the Ayacut 100% of the appropriate rate

Table- 15-1
Irrigation rates for crops other than staple cereal Crops in Orissa

SI. No.	Name of Crop	Irrigation Rates (Rs./Ha)				
		1968-69	1973-74	1974-75	1973-76	1981-82 Onwards
1	2	3	4	5	6	7
1	Dalua	19.77	39 .54	39 . 30	39-30	88.96
2.	Tobacco	37 ,07	37.07	55.60	55 .60	83.40
3.	Potato	24.71	24.71	37.07	37.07	55.60
4.	Vegetables including peas	19.77	19.77	29 .65	29.65	44.48
5.	On ion	24.71	24.71	37.07	37.07	54.36
6.	Wheat	4.94	14.83	22.24	22 •24	32.12
7.	Maize	12.36	12.36	18.53	18.53	27.80
8.	Mung	2. 47	2.47	3.71	3.71	3.56
9.	Groundnut	12.36	12.36	18.53	18.53	27.80
10.	Orchards	29.65	29. 65	44.48	44.48	66.72
11.	Sugarcane	34.59	44.48	66.72	66.72	100.08
12.	Jute	7.41	7.41	11 .12	11.12	16.68
13.	Fodder	12.36	12.36	18.53	18.53	27.80
14.	Pulses	4.94	4.94	7.41	7.41	11.12
15.	Cotton	24.71	24.71	37. 07	37.07	55•60
16.	Til(oil seeds)	4.94	4.94	7.41	7.41	11.12
17.	Betel Leaf	74.13	74.13	111. 20	111. 20	166.79
18-	Arher	12 .36	12.36	18.53	18.53	27.80
19.	Sunhemp	17.30	17.30	25.93	25.93	38.91
20.	Chilly	12.36	12.36	18.53	18.53	27.80
21.	Saru	74.13	74.13	111.20	111.20	166.79
22.	Ragi	6.18	6.18	9.27	9.27	13.99
23.	Mustard	2.47	4.94	7.41	7.41	11.12
24.	Ganja	-	123.35	123.55	123.55	185.33

WATER RATES (Rs./Ha.) in Punjab with effect from Kharif, 1974 are given in Table 16.1

Table 16.1

SI. No.	Name of the Crop	Water Rates (Rs.Per ha..) for				
		Eastern Canal	Bhakra Canal etc.	Sirhind Canal	Upper Bari Doab Canal	Shah Nanan Canal
1.	(i) Sugarcane except on Kharif channels	66.72	81.54	81.54	82.24	67.83
	(ii) Sugar-cane on Kharif channels	66.72	66.72	66.72	67.26	67.83
2.	Rice	48.19	48.19	48.19	48.56	48.83
3.	Cot tor.	39.92	33.36	33.36	33.63	32.54
4.	(i) Garden & Orchards	50.95	50.95	50.95	51.40	50.85
	(ii) Vegetables	44.77	40.77	40.77	41.12	40.70
5.	Maize	31.51	31.51	31.51	28.02	27.13
6.	(i) Kharif Oil Seed	31.51	-	-	-	-
	(ii) Oil seeds except Rabi oil seeds on Kharif channels		31.51	31.51	31.78	32.54
7.	(i) Wheat and gram on Kharif channels	13.59	13.59	13.59	13.74	14.93
	(ii) Wheat except on Kharif channels	—	28.89	28.39	29.13	—
8.	Bajra & Pulses	18.53	24.09	24.09	24.29	24.39
9.	All fodder Crops	14.83	14.83	14.83	14.97	16.26

* Bhakra canal, Bist Doab Canal Nawanshahar Branch, Jullundernder Branch, Grey canal taking off from Sidhwan Branch and Makhu canals and Mayawah & Sodhinagar . Distributories taking off from Ferozepur- Feeder and Sidhwan Branch & Mudki, Golewala, Phlda & Jit Distributarles taking off from Sutlej Navigation Channels of Sirhind Canal.

Note: Lift rates are half the flow rates.

17 Rajasthan

17.1 The present water rates in Rajasthan are shown in Table 17.1

Table 17.1 Water rates (Rs./ha) in Rajasthan w.e.f 1.4.1982

SI. No.	Name of the Crop	(a) Ganga Canal, Bhakra, Ghaggar, Rajasthan & Chambal canal (Irrigation under perennial channels) (b) Irrigation works constructed/improved after 1st January 1952 and all works in the areas of former States of Banswara, Dungapur and Pratapgarh.	Pre-1952 Irrigation works except innundation irrigation works	Pre-1952 innundation irrigation works
(1)	(2)	(3)	(4)	(5)
1.	Sugarcane	143.32	123.56	51.89
2.	Rice	98.84	56.84	24.71
3.	Cotton	88.96	71.66	44.48
4.	Maize	44.48	24.71	19.77
5.	Bajra	44.48	24.71	19.77
6.	Jowar	44.48	24.71	19.77
7.	Pulses	51.89	44.48	32.12
8.	Garden (per year)	180.39	121.08	56.84
9.	Guwar	51.89	44.48	24.71
10.	Simmhemp & Grass	44.48	44.48	32.12
11.	Vegetables	71.66	49.42	27.18
12.	Other Khaif Crops	56.84	44.48	32.12
13.	Wheat	74.13	51.89	32.12
14.	Barley	51.89	37.07	24.71
15.	Gochani & Bejar	71.66	51.89	37.07
16.	Gram 1st Watering (two or Bore watering)	49.42 71.66	44.48 61.78	44.48 46.95
17.	Palewa	22.24	14.83	
18.	Fodder	44.48	44.48	24.71
19.	Oil seeds	56.84	44.48	32.12
20.	Water Nuts	88.96	61.78	32.12
21.	Indigo & other dyes	88.96	44.48	32.12
22.	Tobacco	88.96	51.89	32.12
23.	Lucerne & Poppy	88.96	51.89	27.18
24.	Zeera	88.96	46.95	27.18
25.	Other Rabi crops	64.25	44.48	32.12

Notes: Non-perennial Channels Ganga, Bhakra & Ghaggar & Rajasthan Canal areas:-

All Kharif Crops -

Same rates as perennial channels in column 3 above.

All Rabi crops

(a) For first watering – Palewa rates as per column 3 above would be charged.

(b) For second and subsequent watering - full rates as applicable to perennial channels as per column 3 above would be charged

17.2 Different sets of water rates are in vogue for irrigation from the following categories of irrigation works.

- 1) Ganga canal, Bhakra, Chambal Project, all irrigation works of the former State of Banskara, Dungapur and Pratapgarh and all Irrigation works constructed after 1st January 1952.
- 2) Old tanks or water reservoirs constructed prior January 1952.
 - a) Inundation irrigation works, and
 - b) Except inundation irrigation works.

18. Tamil Nadu:

18.1 The following systems of water rates are prevalent in Tamil Nadu .

- a) Wet Assessment
- b) Dry Assessment
- c) Standard Scales of Water Cess
- d) Special Rates of Water Cess

18.2 a) **Wet Assessment**

The lands are generally classified into wet and dry lands. Wet lands are those which are getting irrigation from a recognized source of irrigation. The sources of irrigation are classified as class I, II, III, IV and V according to their capacity to irrigate the lands. The wet lands under the sources of irrigation are assessed for their land revenue which includes a portion for irrigation. The basic wet assessment of these lands ranges from Rs. 3 to Rs. 22 per acre (or Rs. 7.41 to 54.36 per ha.) Lands, which are not assured of irrigation from any Government source, are classified as dry lands. The basic assessment for the dry lands ranges from Rs. 0.50 to Rs. 8.00 per acre (or Rs. 1.24 to Rs. 19.77 per ha) . Wet lands normally enjoying assured supply of water from Government source of irrigation for two crops are registered as double crop wet lands. The Second crop is charged generally at half of the first crop assessment. In the case of single crop wet lands, if a second crop is raised, an extra charge (Fasli Jasthi) is leviable which is ordinarily half the assessment .

To augment the revenue on irrigation, additional wet assessment was levied under the Tamil Nadu Act 8 of 1963. The rates of additional wet assessment are as follows. They are levied from 1.7.1962.

Details of Additional Wet Assessment

Additional Assessment Levied from 1.7.1962

(i) Irrigation from I and II Class sources:

- a) Single Crop wet lands 45% of the assessment. Total of wet assessment plus additional assessment not to exceed Rs. 18 per acre (or Rs. 44.48 per ha) per fasli.
- b) Double Crop wet lands 45% of the assessment. Total of wet assessment plus additional assessment not to exceed Rs, 27 per acre (or Rs. 66.72 per ha) per fasli.

(ii) Irrigation from III, IV and V Class sources:

- a) Single crop wet lands 30% of the assessment. Total of wet assessment plus additional assessment not to exceed Rs. 12 per acre (or Rs. 29.65 per ha) per fasli.
- b) Double Crop wet lands 30% of the assessment. Total of wet assessment plus additional assessment not to exceed Rs. 17 per acre (or Rs. 42 per ha) per fasli.

b) Dry Assessments:

18.3 When dry lands are irrigated with water from a Government source of irrigation, water cess under the Tamil Nadu Irrigation Cess Act is levied for charging for water in addition to the dry assessment. For normal extension of irrigation of dry lands under the registered source, Standard water rates are levied. The standard water rates have been fixed by dividing the irrigation source into two categories; the irrigation sources placed in the I or II class being treated in the first category and the sources in the lower classes in the second category. The standard water rates range from Rs.1.50 to Rs. 4.00 per acre (or Rs. 3.71 to Rs. 9.88 per ha) for first crop, half of it. For second crop and 1/4th for third and subsequent crops. For dufussal crops, the rates are Rs.4.50 or Rs. 6 per acre (or Rs.11.12 or Rs. 14.83 per ha) if the irrigation is from the source in the second category or from the first category. Under Act 8 of 1963, an additional water cess is levied on the above dry lands, with effect from 1.7.1962 at the following rates:

Rs. 74.13 per ha) for dufussal crop. The new projects have also been notified for levy of special assessment and special water cess at Rs. 10 per acre (or Rs. 24.71 per ha). In respect of projects which are designed for irrigation of dry crops or for short-term crops only, cropwise rates are prescribed.. The revenue due to irrigation is settled at the time of Jamabandhi and collected along with Land Revenue.

18.7 The special water rate for flow irrigation for some of the irrigation projects varying with the type of land and crop is given in Table 18.1.

18.8 Besides the above system, cropwise water rates are levied in respect of lands benefitted by certain projects listed in Table 18.2.

18.9. The special water rates for flow irrigation for some of the irrigation projects and cropwise rates for operational projects indicated in Tables 18.1 and 18.2 do not cover any percentage of the operation and maintenance costs and interest charges on Capital Cost of the Project. The average cost per ha. for operation and maintenance of irrigation schemes for 1982-83 worked out to Rs 75.93.

Table : 18.1

Special Water- Rates (Rs./ha. for selected Projects of Tamil Nadu)

S. No	Name of Project	Dry Land						Diffusa l Crop	Wet Land				
		I Crop		II Crop		III Crop							
		Wet	Dry	Wet	Dry	Wet	Dry						
1	(2)	(3)	(4)	(5)	(6)	(7)							
	Aranlar	11.12	8.35	5.56	5.56	5.56	2.77	16.86	7.78 to 35.93				
	Sathanur		37.07		18.53		9.27		Single Doub Compound Crop le ed double Wet Crop Crop				
	(North Arcot and South Arcot dists.)							55.60	37.07	49.42	55.60		
	Tholudur		37.07		18.53		9.27	55.60	Single Crop		Double crop		
	(Willington Reservoir)								37.07		55.60		
	(South Arcot district)												
	Cauvery		24.71		12.36		6.18	37.07	I	II	III	Diffu	
	Mettur								Crop	Crop	crop	sal	
									Crop				
									18.53	12.36	6.18	30.89	
									(Proprietary wet and minor inam wet				

Table: 18.2 CROP-WISE WATER RATES FOR SELECTED PROJECTS OF TAMIL NADU

SI. No.	Name of project	Type of irrigation	Rates for Principal Crops Cotton (Rs. per Fruit Ha)						
			Rice	Millets	Sugar-cane	Tobacco	Vegetables	Trees	
1.	Lower Bhavani	Flow	37.07	18.53	-	49.42	37.07	37.07	40.42
2.	Mettur Canal Scheme	Flow	37.07	18.53	-	48.42	37.07	-	-
3.	Chittar Pattankal	Flow	49.42	42.71	-	61.78	49.42	49.42	61.76
4.	Amaravathi	Flow	37.07	18.53	49.42	-	37.07	37.07	40.42
5.	Neyyar Irrigation Project Stage-II	Flow	DO						
6.	Villathurai Irrigation	Lift	37.07	18.53	-	49.42	37.07	37.07	49.42

Note: In addition to the above rates additional water cess is leviable at the following rates with reference to Act 8 of 1963.

I & VII Class Sources: 75% of water cess (The levy is subject to an aggregate amount per acre (or Rs.37.07 per ha) per crop for land revenue, water cess and additional water cess)

III, IV and V Class: 37.5% of water cess (——— do ———)

19 Tripura

At present no water rates are being collected from the farmers. However, the water rates proposed to be collected on the completion of the three medium projects viz. i) Gumti Irrigation ii) Khowai Irrigation and iii) Manu Irrigation are shown in Table 19.1.

Table 19.1 Proposed Water Rates (Us. per ha) in Tripura

SI. NO	Name of the Project	Name of the Crop	Proposed Water Rates (Rs./ha)
1.	Gumti Irrigation Project	(1) Rice	30
		Wheat	30
		Sugarcane	80
		Jute	20
		Others	55
2.	Khowai Irrigation Project	(2) Rice (Boru)	120
		Rice (Aman & Aush)	30

	Wheat	30
	Sugarcane	80
	Jute	20
	Others	25
3. Manu Irrigation Project	(3) - do- (Same as under	
	(2) And Potato	30

20 Uttar Pradesh

20.1 The various Canal Systems are classified into 4 schedules for the purpose of levying water rates. The water rates with effect from 1.7.83 for Canal Systems falling in different schedules are shown in Table 20.1.

Table 20.1 water Rates (Rs./ha) in Uttar Pradesh with effect from 1.7.1983

For canal Systems included in	Name of crops	Water Rates	(Rs./ha)
		Flow Irrigation	Lift Irrigation
(1)	(2)	(3)	(4)
Schedule I	1. Sugarcane	237.23	118.61
	2. Paddy	143.32	71.66
	3. Vegetables, gardens (per fasal) Waternuts, Poppy	143.32	71.66
	4. Potato	177.92	88.96
	5. Tobacco	153.21	76.60
	6. Wheat, Barley &crops mixed with wheat or barley	143.32	71.66
	7. Cotton	56.84	28.42
	8. Fodder crops	49.42	24.71
	9. Green Manure	34.60	17.30
	10. Other Rabi crops	106.26	53.13
	11. Other Kharif crops	86.49	43.24
Schedule II	1. Sugarcane	237.23	118.61
	2. Paddy (excluding broadcast paddy on Doon canals)	36.49	43.24
	3. Vegetables, gardens (per fasal) Water nuts Poppy.	86.49	43.24
	4. Potato	177.92	88.96
	5. Broad-cast paddy on Doon Canals	56.84	28.42
	6. Tobacco	106.26	53.16
	7. Tea orchards on Doon canals	106.26	53.13

For canal Systems included in	Name of crops	Water Rates	
		Flow Irrigation	Lift Irrigation
(1)	(2)	(3)	(4)
	8. Wheat, Barley and crops mixed with wheat or barley	86.49	43.24
	9. Cotton	29.05	14.83
	10. Fodder crops	19.77	9.88
	11. Green manure	14.83	7.41
	12. Other crops of Rabi	56.84	28.42
	13. Other crops of Kharif	49.42	24.71
Schedule III	1 . Sugarcane	118.61	59.31
	2 . Paddy	64.25	32.12
	3. Vegetables, gardens (per fasal), Water Nuts Poppy	64.25	32.12
	4. Potato	410.20	205.10
	5 . Tobacco	56.84	28.42
	6. Wheat, Barley & crops mixed with wheat & barley)	64.25	32.12
	7 .Cotton	19.77	9.88
	8. Fodder crops	14.83	7.41
	9. Green manure	14.83	7.41
	10. Other Crops of Rabi	34.60	17.30
	11. Other Crops of Kharif	118.61	59.31
Schedule IV	1 . Sugarcane	49.42	24.71
	2 . Paddy	19.77	9.88
	3. Vegetables, garden (per fasal) Water Nuts, Poppy	19.77	9.88
	4 . Potato	49.42	24.71
	5. Cotton	17.30	8.65
	6. Fodder crops	17.30	8.65
	7 . Green manure	17.30	8.65
	8. Other crops of Rabi	19.77	9.88
	9. Other crops of Kharif	19.77	9.88

21 West Bengal

21.1 The water rates prevailing in West Bengal since 1.7.1977 are uniform throughout the state in all project which are as follows:

<i>Season</i>	<i>Rate per ha.</i>
Kharif	Rs. 37.06
Rabi	Rs. 49.42
Boro	Rs.123.55

22 Goa Daman and Diu

22.1 In Goa, Daman & Diu, the lands Irrigated under different irrigation projects are as below:

- i) Major Irrigation - 980 ha
- ii) Medium Irrigation - 650 ha
- iii) Minor Irrigation - 14.977 ha

22.2 The water rates are leviable on two types of schemes crops such as paddy, sugarcane, coconut, arecanut, bettlenut, plantation, ground nuts, chillies, onions and vegetables. The charges levied for the schemes, which are enforced since June 1977, are shown in Table 22.1.

Table 22.1 Water in Goa,Daman & i Diu w.e.f. June 1977.

S. No.	Name of crop	Water Rates in Rs. /ha	
		Flow irrigation Schemes	Lift irrigation Schemes
1	2	3	4
1.	Paddy	75.00	150.00
2.	Sugarcane	150.00	300.00
3.	a) Coconut b) Arecanut c) Bettlenut d) Plantations	75.00	150.00
4.	a) Groundnut b) Chillies c) Onion d) Vegetables	50.00	100.00 100.00

23 No water rates are enforced in Andaman & Nicobar Islands.

24 Delhi

The water Rates for Minor Irrigation Schemes prevalent with effect from 1951 are shown Table 24.1

Table 24.1 Water Rates (Rs/ha) with effect from 19K1 for Minor Irrigation in Delhi.

Class	Nature of Crops	Water Rates (per ha)
1	2	3
II	1. Garden Orchards & vegetables	88.96
III	2. Wheat Barley	44.48
IV	3. Oil seeds	29.65
V	4. Gram measure & pulses	44.48
VI	5. Grass	59.31
VII	6. Fodder	22.24
JAID RABI		
VI	7. Maize	29.65
V	8. Jowar and other fodder corp	29.96
II	9. Vegetables	88.96
XX	10. Tobacco	88.96
XX	11. Indigo & other dyes and drugs	88.16
KHARIF		
IV	12. Bajra	29.65
V	13. Jowar & other fodder crops	22.24
IV	14. Fibers & other crops not otherwise specified	44.48
II	15. Vegetables	88.96
VI	16. Grass	59.31
IV	17. Maize	29.65
II	18. Garden & Orchard	88.96
I	19. Sugarcane	103.38
	20. Special paddy (Rice)	98.84
II	21. Vegetables	88.96

Source : CWC, Rates for surface Water in India (January 1988).

Note: Information in respect of Arunachal Pradesh, Nagaland and Sikkim is not included in the above source.

STATEWISE POSITION ON OTHER LEVIES/CESSES ON IRRIGATED AREA

(Rate Rs. per ha.)

State/Item	Water Rate*	Betterment Levy	Irrigation Cess	Crop Cess	Any Other Charges having bearing on Irrigation
1	2	3	4	5	6
1.Andhra Pradesh	Yes				
2.Bihar	“	-	-		-
3.Gujarat	“	-	Local Cess on water rate @ 20 paise per rupee.		
4.Haryana	“				—
5.Kerala	“	-	Annually on the basis of gross area Irrigated.		
6.Karnataka	“		-		
7.Madhya Pradesh	“	Not in force at present.		Crop Cess @ Rs.10 for canal irrigation and Rs. 5 per acre for lift irrigation.	
8.Maharashtra	"		Local Cess on Water rates @ 20 paise per rupee.	Education Employment Guarantee Cess	(a) Education Cess: i) Sugarcane = Rs 190 per ha. ii) Banana = Rs 110 " "
					iii) Cotton = Rs 40 " " iv) Groundnut = Rs 40 " " (b)

State/Item	Water Rate*	Betterment Levy	Irrigation Cess	Crop Cess	Any Other Charges having bearing on Irrigation
1	2	3	4	5	6
					Employment guarantee Cess at Rs. 25 per ha. on all agricultural lands on which irrigated crop are grown .
9. Orissa	Yes		—	—	—
10. Punjab.	“““		—	—	—
11. Rajasthan			—	—	—
12. Tamil Nadu	“	Additional Wet assessment @ 45% of assessment for class I&II Class III, IV & V.	Special Water Cess varying with the class of irrigation sources and crops	-	
13. Uttar Pradesh	N				
14. West Bengal	“	Rs. 400 (for cultivable lands). Rs.570 (for waste lands)			

* Statewise water Rates are given at Annexure - 2.1 to Chapter 2.

Source: Rates for surface water in India, CWC, Jan 1988 and information supplied by the states.

Annexure 2.3
(Para 2.23)

Guidelines suggested by the Second irrigation commission, 1972 for fixing Water Rates

The considerations to be kept in view in fixing irrigation rates as pointed out by the Irrigation Commission in 1972 are summarized in the following:

- i) From the irrigator's point of view, water rates should be related to the benefit which irrigation confers rather than to the cost of irrigation projects.
- ii) Since the irrigation requirements vary not only from crop to crop but also for the same crop grown in different seasons, such as the first, second or third crop of rice, the quantity of water supplied is also relevant.
- iii) Adequacy and dependability of supply are important considerations in fixing irrigation rates.
- iv) On canals, which are under-utilised, a development rebate, which should be progressively reduced, would help to ensure fuller utilisation. Of course, there will always be some lag in the utilisation of water during the initial years after the completion of a project.
- v) In fixing water rates for the different crops the State policy in respect of cropping needs to be kept in mind.
- vi) Irrigation is only one of the basic inputs used by a farmer and it is difficult to evaluate the precise contribution that it makes to the farmer's net gain. Hence, the Maharashtra Irrigation Commission (1960-62) had suggested that water rates, on a crop basis, should be fixed between 6 to 12 per cent of the gross income, the gross income being easier to calculate. The higher limit of 12 per cent was suggested for Cash crops and the lower one for food and fodder crops, which have a lower profit margin. The "Committee to Suggest Ways and Means of Improving the Financial Results of Irrigation Projects," appointed by the Government of India in 1964, had made a similar recommendation, but it has suggested a range of between 5% and 12% of the gross income.
- vii) Ordinarily, there should be no disparity in water rates between one project and another. But when there is a marked difference in the quality of service, there would be legitimate ground for differential rates.
- viii) Water rates should be levied on a Crop basis, except in the case of irrigation from tubewells.
- ix) Between regions with a similar class of supply, there should be the minimum disparity, if any, in the rates charged.

- x) For fixing rates, irrigation should be divided into A, B and C categories on the basis of the quantity and timeliness of supply. Lower rates may be fixed where, on account of good rainfall, the demand for irrigation water is less or where the supply is inadequate and uncertain.
- xi) The general level of rates in a State should be such that, taken as a whole, the irrigation schemes do not impose any burden on the general revenues.
- xii) Where lift irrigation is done at the farmer's cost, because of the extra effort or expenditure involved in lifting water, he takes care that water is used economically and wastage is reduced to a minimum. The resulting saving in terms of water justifies a lower rate for lift irrigation.
- xiii) Tubewell water should be charged on the basis of the quantity of water supplied at the tubewell. Of course, there could be some disparity in the amount which irrigators pay for areas located at different distances from the tubewell, because of transit losses; but with lined water courses and a proper roster of supply, the disparity can be considerably reduced.
- xiv) While promotional water rate may be necessary on projects where cultivators are not familiar with irrigated agriculture and the demand for water is not keen prolonged concessions are undesirable as they entail loss of revenue and accustom the irrigators to low rates which become more difficult to raise as time passes. In areas where cultivators are keen on irrigation, promotional rates are not necessary.
- xv) Water rates should be revised every five years.
- xvi) It becomes, difficult for a single State to take measures affecting large numbers of its people if there is no corresponding action by neighboring States. In raising water rates, therefore, groups of neighboring States must have a common policy.
- xvii) Considering the minimum level of irrigation rates, the cost of irrigation from sources other than State irrigation works should also be kept in view.
- xviii) In canal commands where the State has to supply water by lifting it, rates charged should be higher than the rates for gravity flow to take into account additional cost of lifting.
- xix) In the interest of promoting fuller utilisation of irrigation supply, there is justification for imposing of a minimum charge for every unit of culturable area in the command of a project so as to, realise an assured minimum amount of revenue to meet the working expenses of the project. However, such an irrigation cess should be low and levied only in areas where a regular supply of water is assured. This irrigation cess should be in the nature of a compulsory levy payable by all the owners of land in the command area in addition to which water rates should be

payable only by irrigators. The levy of such cess would obviate the need for any long term agreement regarding intake of irrigation.

Water charges for conjunctive use of Surface and Ground Water

The conjunctive use may take one of the various forms described below:

- (1) Pumped water from tubewell sunk along-side of a canal for augmenting canal supplies;
- (2) Water from shallow tubewells sunk as an anti-waterlogging measure, put into irrigation channels;
- (3) Private tubewells or filter-points sunk in canal commands for irrigating crops when canal water is not available or is available inadequately;
- (4) State tubewells sunk in a canal command to irrigate pockets which cannot be served with canal water;
- (5) Tubewell water for a second crop and canal water for the first crop;
- (6) Tubewell and canal water for irrigating the same area in a crop season.

In the first two cases, the canal supplies are augmented by ground water, and normal irrigation rates would naturally be applicable to areas irrigated by the channels, as the two waters cannot be separated, and the quality of service which these channels give is the same as from canal waters. In the third case, by sinking a private tubewell or a filter point the farmer derives additional benefit by irrigating his fields when canal supplies are not available. Here, normal canal water rates should be charged where canal water is used for irrigation, but there should be no charge where the irrigator uses water only from his own source. In the fourth case, tubewell irrigation in the canal command is no different from tubewell irrigation elsewhere and obviously normal tubewell rates should be applicable. In the fifth case, the canal water rate should be charged for the first crop and the tubewell rate for the second crop irrigated with tubewell water. In the sixth case, both canal and tubewell charges should be levied. Had the tubewell not been installed, the irrigator would have paid canal rates for irrigating with the available canal water. On installing a tubewell, he derives an additional benefit by using tubewell water during periods of low supply when channels run in a roster. He can, therefore, confidently grow high-yielding and better quality crops, which other irrigators on the canal with an inadequate supply may not be able to grow. Therefore, a tubewell charge, in addition to the canal rate, would be justified on account of the increased production, which he secures, by the use of tubewell water.

Source: CWC - Rates for Surface Water in India -Jan; 1988.

**Annexure 2.4
(Para 2.43)**

Capital outlay, revenue expenditure and revenue receipts relating to major and medium irrigation projects

(RUPEES in lakh)

State	Year	Capital outlay at the end of the year	Revenue receipts during the year	Revenue receipts during the year	Depreciation	Excess of expenditure excluding depreciation) over receipts	Excess of expenditure (including depreciation) over receipts
Andhra Pradesh	1987-08	233541 .68	13463.58	543.71	2335.42	12919.87	15255.29
	1988-89	262515.58	49098.47	544.07	2480.29	48554 .40	5 1034.69
	1989-90	289837.27	31553.70	3520.79	2761.76	28032.91	30794 .67
Bihar	1987-88	246126.08	3908. 18	767.13	2461 .26	3141 .05	5602.31
	1988-89	273078.67	5814 .28	654.41	2596.02	5159.87	7755.89
	1989-90	302007.56	5838. 71	609.18	2875.43:1	5229.53	8104.96
Gujarat	1987-88	178121 .98	21199.50	1368 .60	1781.22	19830.90	21612.12
	1988-89	197070. 17	29787.46	1690.09	1875.96	28097.37	29973.33
	1989-90	223266.88	35590.40	1704.77	2101.69	33885.63	35987.32
Himachal Pradeah	1987-88	1716.53	19.65	18.90	17.17	00.75	17.92
	1988-89	1942.21	33.45	0.21	18.29	33.24	51. 53
	1989-90	2127.75	35.85	0.29	20.35	35.56	55.91
Haryana	1987-88	78754.60	8665.73	784.34	787.55	7881 .39	8668.94
	1988-89	92613.68	9390.09	1554.80	806.84	7835.29	8642.13
	1989-90	86350.59	11611 .61	1357.23	844.82	10254.38	11099.20
Karnatak*	1987-88	171449.78	12882.56	1335 .04	1714.70	11547.52	13262.22
	1988-89	188066.74	13843.26	1430 .90	1797.68	12412.36	14210.04

State	Year	Capital outlay at the end of the year	Revenue receipts during the year	Revenue receipts during the year	Depreciation	Excess of expenditure excluding depreciation) over receipts	Excess of expenditure (including depreciation) over receipts
	1989-90	208922.09	15361.82	1614.34	1984.94	13747.48	15732.42
Kerala	1987-88	63235.39	1964.90	123.96	632.35	1840.94	2473.29
	1988-89	68458.97	2228.55	263.14	658.47	1965.41	2623.88
	1989-90	76010.94	1929.80	163.59	722.35	1766.21	2488.56
Madhya Pradesh	1987-80	210503.65	4620.04	1470.97	2105.04	3149.07	5254.11
	1988-89	235030.53	5605.96	1968.81	2227.67	3637.15	5864.82
	1989-90	258650.64	5787.40	1230.46	2468.41	4556.94	7025.35
Maharashtra	1987-88	310694.94	31765.25	1874.00	3106.95	29891.25	32998.20
	1988-89	350285.25	35982.15	1873.16	3304.90	34108.99	37413.89
	1989-90	400517.81	43894.52	2759.30	3754.02	41135.22	44889.24
Or issa	1987-88	131159.18	1441.18	660.18	1311.59	781.00	2092.59 .
	1988-89	145490.55	1344.58	556.59	1383.25	787.99	2171.24
	1969-90	159523.73	1611.05	455.78	1525.07	1155.27	2680.34
Punjab	1987-88	71388.32	5752.99	1257.53	713.88	4495.46	5209.34
	1988-89	87191.16	6539.89	1664.99	792.90	4874.90	5667.80
	1989-90	88735.15	7812.45	1737.10	879.63	6075.35	6954.98
Rajasthan	1987-88	131155.71	10761.32	1219.20	1311.56	9542.12	10853.68
	1988-89	143203.39	11587.92	1125.86	1371.80	10462.06	11833.86
	1989-90	155170.90	12989.82	1599.44	1491.87	11390.38	12882.25
Tamil Nadu	1987-88	57730.63	6937.51	134.23	577.31	6803.28	7380.59
	1988-89	61923.39	6395.67	125.81	598.27	6269.86	6868.13

State	Year	Capital outlay at the end of the year	Revenue receipts during the year	Revenue receipts during the year	Depreciation	Excess of expenditure excluding depreciation) over receipts	Excess of expenditure (including depreciation) over receipts
	1989-90	65191 .37	8089.86	157.62	635.57	7932.24	8567.81
Uttar Pradesh	1987-88	265338.39	25412.97	1716.08	2653.39	2396.89	26350.28
	1988-89	298428.51	30431 .82	3039.50	2818.84	27392.32	30211 .16
	1989-90	321798.58	35070.40	3661 .46	3101.14	31408.94	34510.08
West Bengal	1987-88	47460.52	3621 .83	136.83	474.61	3485.00	3959.61
	1988-??	51255.71	4126.58	147. 11	493.58	3979.47	4473.05
	1989-90	55531 .19	4569.02	157.53	533.93	4411.49	4945.42

* At the rate of one per cent on mean capital outlay. In the case Of 1987-86 the depreciation hat bean calculated @ 1% on capital Outlay at the year-end.

@ Figures are provisional

**Annexure - 2.5
(Para 2.43)**

FINANCIAL RESULT OF SELECTED IRRIGATION PROJECTS

(Rupees In lakhs)

<i>State</i>	<i>No. Of projects</i>	<i>Year</i>	<i>Capital outlay at the end of the year</i>	<i>Revenue receipts</i>	<i>Revenue expenditure</i>	<i>Excess of expenditure (excluding interest) over receipts</i>	<i>Interest on capital outlay</i>	<i>Excess of expenditure (including interest) over receipt</i>	<i>Depreciations</i>	<i>Excess of expenditure (including interest and depreciation over receipts</i>	<i>Rate of interest on capital outlay</i>
Bihar	4	1987-88	375.89	86.09	326.09	240.00	13.76	253.76	3.76	257.52	7%
		1988-89	375.89	82.03	473.39	391.36	13.76	405.12	3.76	408.88	
		1989-90	375.89	34.12	603.54	569.42	13.76	583.18	3.76	586.94	
Gujarat	5	1987-88	16091.43	298.53	557.21	258.68	1874.52	2133.20	160.9J	2294.11	12%_
		1989-90	16834.22	544.98	454.26	(-) 90.72	1955.98	1865.26	164.63	2029.89	
		1990-91	17630.95	613.72	1059.89	446.17	2047.44	2493.61	172.33	2665.94	
Haryana	6	1987-88	24546.25	661.90	1043.35	381.45	1253.91	1635.36	245.46	1880.82	5%
		1988-89	25955.38	895.82	1252.31	356.49	1324.37	1680.86	252.51	1933.37	
		1989-90	26377.14	608.37	1618.31	1009.94	1345.46	2355.40	261.66	2617.06	
Kerala	8	1987-88	7286.90	75.59	123.61	48.02	788.23	836.25	72.87	909.12	11.5 to 12%
		1988-89	7675.42	74.26	139.52	65.26	881.69	946.95	74.81	1021.76	
		1989-90	8521.57	63.40	162.16	98.76	963.03	1061.79	80.98	1142.77	
Maharashtra	19	1987-88	72317.24	485.70	6757.16	6271.46	5054.11	11325.57	723.17	12048.74	7%
		1988-89	77244.96	275.35	5158.56	4883.21	5984.24	10867.45	747.81	11615.26	
		1989-90	82368.74	404.86	8399.24	7994.38	6628.13	14622.51	798.07	15420.58	

<i>State</i>	<i>No. Of projects</i>	<i>Year</i>	<i>Capital outlay at the end of the year</i>	<i>Revenue receipts</i>	<i>Revenue expenditure</i>	<i>Excess of expenditure (excluding interest) over receipts</i>	<i>Interest on capital outlay</i>	<i>Excess of expenditure (including interest) over receipt</i>	<i>Depreciations</i>	<i>Excess of expenditure (including interest and depreciation over receipts</i>	<i>Rate of interest on capital outlay</i>
Orissa	30	1987-88	28671.26	31.17	867.47	836.30	1956.37	2792.67	286.71	3079.38	7%
		1988-89	29889.24	59.82	798.23	738.41	2032.17	2770.58	292.80	3063.38	
		1989-90	32260.86	70.19	1220.36	1150.17	2119.99	3270.16	310.75	3580.91	
Punjab	9	1987-88	7680.81	1028.02	1688.63	660.61	523.02	1183.63	76.81	1260.44	7%
		1908-89	8678.25	1195.45	1632.11	436.66	572.40	1009.06	81.80	1090.86	
		1989-90	9384.89	950.42	2299.12	1348.70	632.02	1980.72	90.32	2071.04	
Rajasthan	6	1987-88	71228.28	1085.78	2473.05	1387.27	6849.35	8236.62	712.28	8948.90	10%
		1988-89	76949.21	780.65	1950.16	1169.51	6954.08	8123.59	740.89	8864.48	
		1989-90	83153.59	1222.50	2288.63	1066.13	8178.78	9244.91	800.51	10045.42	
Tamil Nadu	43	1987-88	69290.11	307.74	820.75	513.01	2983.68	3496.69	692.90	4189.59	4.5 to
		1988-89	74793.72	271.17	919.44	648.27	3245.11	3893.38	720.42	4613.80	12.75%
Uttar Pradesh	@ 16	1987-88	208629.21	1577.97	14976.71	13398.74	10724.28	24123.02	2086.29	26209.31	5.51
	25	1988-89	232702.40	2976.52	18349.86	15373.34	10867.13	26240.47	2206.66	28447.13	
	@ 16	1989-90	50729.61	2569.31	32010.08	29440.77	12069.20	41509.97	2417.16	43927.13	
West Bengal	9	1987-88	26233.46	94.17	1382.39	1288.22	1526.36	2814.58	262.33	3076.91	4 to 6%
		1988-89	27390.60	103.54	1459.18	1355.64	1595.52	2951.16	268.12	3219.28	
		1989-90	28727.28	104.96	1553.57	1448.61	1676.68	3125.29	280.59	3405.88	

* At the rate of one per cent on mean capital outlay. In the case of 1987-88, the depreciation has been calculated @ 1 per cent on capital outlay at the year end.

** Include revenue forgone/remission; @ Major Projects only.

EXTRACTS FROM ACCOUNT CODE VOL. IV

APPENDIX – 2 (See Article 281)

ADMINISTRATIVE ACCOUNTS OF IRRIGATION, NAVIGATION, EMBANKMENT AND DRAINAGE WORKS, ELECTRICITY PROJECTS AND MULTIPURPOSE RIVER-PROJECTS

Introductory	1	Part IV-Interest Account	9
Classification	2	Part V-Account of Indirect Charges	11
Part I-General Abstract of Financial Results	3	Part VI-Statement comparing Capital Cost with Sanctioned Estimates	12
Part II-Detailed Account of Capital Expenditure	4		
Part III-Revenue Account	8	Review	14

NOTE 1. The rules in this Appendix may be applied in relation to the accounts of a Government with such modifications as may be decided by the Government after consultation with the Comptroller and Auditor General. Vide Article 19 of Volume I of this Code.

NOTE 2. The rules in this appendix are primarily intended to apply to the administrative Accounts of Irrigation, Navigation, Embankment and Drainage Works. They may, however, be applied mutates to the Administrative Accounts of the Electricity Projects and Multi-purpose River Projects.

Introductory

1. The Accountant General may be required by Government to prepare annually proforma accounts (otherwise known as Administrative Accounts) of irrigation, navigation, embankment and drainage projects for which capital and revenue accounts are kept. These accounts should be prepared in Form 60, which is divided into the following six parts:

Part I. General Abstract of Financial Results.

Part II. Detailed Account of Capital Expenditure.

Part III. Revenue Account

Part IV. Interest Account

Part V. Account of Indirect Charges

Part VI. Statement comparing Capital Cost with Sanctioned Estimates.

Accounts of individual projects are kept in Parts II to VI for each, and the general results of all projects are abstracted in Part I.

Classification

2 The projects for which Administrative Accounts are prepared are classified thus:

A Irrigation Works

1. Productive

2. Unproductive

B. Navigation, Embankment and Drainage Works

1. Productive

2. Unproductive

In Part I projects should be grouped according to this classification, and on all separate Accounts of them the detailed classification of each project, should be indicated prominently.

NOTE: The classification of works into (1) productive and (2) unproductive is governed by such general principles as may be laid down in this behalf by the Government concerned in consultation with the Accountant General. See also Article 26 of Volume III of this Code.

Part I. General Abstract of Financial Results

3. Part I is a summary of the financial results of all projects in the province excluding those for which no capital accounts are kept, the figures in respect of individual projects being taken from the detailed accounts as brought out to other parts.

NOTE: Projects should be arranged serially in the order of the dates on which the construction estimates were closed. Projects whose construction estimates have not been closed should come next in the arrangement and they should be detailed in the order of the dates of sanction to the estimates. This arrangement should not, however, interfere with the classification of projects between Irrigation 2nd Navigation, etc. and between productive and unproductive prescribed in the preceding paragraph.

Part II. Detailed Account of Capital Expenditure

4. Part II, the Detailed Account of Capital Expenditure, is a statement of the total direct charges incurred to end of the year against all the sanctioned estimates of capital expenditure.

The outlay should be detailed by such branches and sections of the projects as are shown separately in the sanctioned project estimate, and under each it should be given in full detail of minor heads (including "Receipts and Recoveries on Capital Account") and detailed heads.

NOTE-1 Charges under the minor heads "Establishment" and "Tools and Plant" should be detailed only if the entire expenditure of a circle of superintendence, or of any other prescribed unit of distribution of charges relates to a single project; in other cases, the charges to be shown under each of these two heads will be the lump sums which may be debited to a project according to the rules of distribution of such charges made by Government in consultation with the Accountant General. See Article 42 of Volume III of this Code.

NOTE-2 In the case of projects for which completion reports have been submitted, it is not necessary to show details of expenditure by detailed heads under the sub-division of minor heads.

NOTE-3 In the case of projects in respect of which the construction estimates have been closed and the completion reports approved by Government and in respect of which no further capital expenditure is being incurred under open capital estimates, all details of capital expenditure should be omitted, references being given to the Administrative Accounts of the years in which the capital accounts were shown in detail.

NOTE-4 the particulars of apportionment of the capital expenditure among the Irrigation Major Heads need not be shown in the capital account.

5 Expenditure on surveys which was incurred before construction commenced should be brought on to the account by an entry in the column headed "To end of the year", qualified by a suitable explanation in the column for "Remarks".

6 For purposes of comparison with estimates, the form of Part II provides a column for "Cost of construction as now estimated". This column is written up thus: -

- i) If the construction estimate is still open. The estimated cost
- ii) If the construction estimate is closed. the aggregate of (1) actual expenditure on the closed construction estimate, (2) actual expenditure on all closed estimates of open capital and (3) estimated cost of all open capital estimated the accounts of which are still open.

In the case of projects the construction estimates of which have been closed the difference between the figures in this column and column 4 of Part VI will indicate the amount of the open capital sanctions still operative i.e., the further authorised liabilities of the project.

7. If the construction estimate has been closed, the date on which it was closed should be noted in the column for "Remarks".

Part III: Revenue Account

8 Part III, the Revenue Account, is a statement making an up-to-date comparison of the gross (i.e., direct as well as indirect) figures of the receipts and the working expenses of a project yielding revenue. The receipts should be detailed by minor heads, and the working expenses by both minor heads and sub-divisions of minor heads. The difference between the gross receipts and the gross charges will represent the net revenue or the deficit, as the case may be.

NOTE: The Revenue Account should be opened for a project as soon as any section of it is completed and begins to yield revenue.

Part IV: Interest Account

9 Part IV, the Interest Account, is a simple debit and credit account showing on one side the charges for the interest and on the other the net revenue, or deficit, as worked out in Part III.

10 Interest is adjusted in the Administrative Accounts of Irrigation, etc., projects stated below:

- a. For capital outlay met out of specific loans raised by Government, at such rate of interest as may be prescribed by Government having regard to the rate of interest actually paid on such loans and the incidental charges incurred in raising and managing them;
- b. For capital outlay provided otherwise, at such rate of interest as may be determined by Government in consultation with the Accountant General.

NOTE-1. By specific loans are meant loans that are raised in the open market for one specific purpose which is clearly specified in the prospectus and in regard to which definite intimation is given at the time of the raising of the loans that for the purpose of accounts they are to be regarded as specific loans.

NOTE-2 Interest is calculated on the total direct capital outlay to end of the previous year plus half the outlay of the year itself.

Part V Account of Indirect Charges

11 Part V, the Account of Indirect Charges, which is prepared in two separate sections - capital and revenue - is a simple statement of the indirect charges shown below:

Capitalised abatement of land revenue - At twenty times the annual amount of land revenue remitted.

NOTE: This charge should not be made in cases when the capitalised value has been awarded in lieu of abatement and has been debited as a direct charge.

Audit and Accounts Establishment - The actual expenditure, where it is readily ascertainable as in the case of separate Audit and Account Offices constituted for specific projects otherwise, 1 per cent on works expenditure.

11-A The proceeds of "Betterment levy" though treated as "indirect Receipts" in the accounts, should be taken in reduction of Indirect Capital Expenditure in the Administrative Accounts.

Part VI Statement comparing Capital Cost with Sanctioned Estimates

12 Part VI compares both the direct and indirect charges incurred up-to-date on a project with the amount of sanctioned estimates.

13 If the construction estimate is still open, no entries should be made in columns 2 to 4, headed "Charges against closed sanctions" and in column 8 "Total charges to date against old and current sanctions". But, if it has been closed, all the columns of the form should be written up columns 2 to 4 being used in respect of all working estimates (construction or open capital) which have been closed, and columns 5 to 7, headed "Current Sanctions", in respect of all working estimates of open capital, the accounts of which are still open. Particulars of the sanctioned estimates, e.g., the numbers and dates of the orders of Government issued from time to time, the amounts of estimates, etc., need not be entered in either case.

Review

14 The Administrative Accounts should be submitted to Government in print as soon as possible after closing the final accounts for March. The Accountant General should review the accounts and send with them a report of the points which his review may suggest. In the report should be mentioned specially all points requiring attention, e.g., (1) cases in which, in the Accountant General's opinion, a change of classification of projects from "productive" to "unproductive" or vice versa may be indicated, (2) cases in which an abnormal increase under "Working Expenses" is not accompanied by an adequate increase in the "Receipts", or (3) cases in which "Receipts" show a marked decline and there is no known reason for this.

NOTE-1 For the purpose of the review the figures shown against the minor head "Recoveries of Expenditure" should be deducted both from "Gross Receipts" and from "Gross Working Expenses".

NOTE-2 Any practical suggestions calculated to reduce the working expenses, to develop the gross receipts, or to effect economies otherwise, which may occur to the Accountant General, should ordinarily be made separately, the report being confined to mentioning the salient features of the accounts in a manner intelligible to an outsider.

15 Two copies of the accounts (with Report) should also be submitted simultaneously to the Comptroller and Auditor General. If printed copies cannot be dispatched so as to reach the Comptroller and Auditor General by the dates prescribed in Annexure to Chapter 21, the first copy should be sent on the due date in manuscript. A separate report should also be submitted at the same time reviewing the working of the various Irrigation projects with reference to the desirability of changing the existing classification of a particular work or works from "Productive" to "Unproductive" or vice versa, on the basis of the actual yield and the anticipated return from such works. This review may, however, if Government has no objection, be included in the report to Government, which the Accountant General submits under paragraph 14 above.

FORMS

FORM A.O. 60

(See Appendix 2, Paragraph 1)
ADMINISTRATIVE ACCOUNTS

PART I General Abstract of Financial Results of Irrigation, Navigation, Embankment and Drainage Works for which Capital and Revenue Accounts are kept for the year 19 -19.

Name of projects	Cost of construction as now estimated			Capital Outlay							
	Direct charges	Indirect charges	Total	During the Year				To end of the year			
				Date of closure of construction estimate or in the case of works under construction, date of sanction	Direct Charges	Indirect charges	Total	Direct charges	Indirect charges	Total	
1	2	3	4	5	6	7	8	9	10	11	
			Gross receipts during the year				Working expenses and maintenance during the year inclusive of indirect charges				
Accumulated arrears of simple interest to the end of the year	Total capital invested to end of the year (column 11 and column 12)		Direct Receipts	Portions of land revenue due to works	Total	Direct charges	Indirect charges	Total	Net revenue Surplus Deficit		
12	13		14	15	16	17	18	19	20		
						Percentage of net revenue (column 20) on capital (Column 13)					
Percent capital column Gain "G" Loss "L"		Simple interest for the year as detailed in Part IV.		Net gain	Net loss	During	During	During	Prescribed Remarks rate of interest as test of productivity		
21		22		23	24	25	26	27	28	29	

FORMS

FORM A.O. 60 contd.

..... project

PART 11 Detailed Account of Capital Expenditure for and to end of year 19 -19

Heads of Account (Minor and Detailed heads)	Direct Charges		Coat of Construction as now estimated	Remarks (If any)
	During the year	To end of the year		
1	2	3	4	5
	R	R	R	

... Project

PART III Revenue Account for and to end of year 19 - 19 **Date of closing of construction estimate**

	Gross	Receipt		Gross Working Expenses		
	Total			Total		
Minor Heads	During the year	To end of the year	Heads of Account (Minor and Detailed heads)	During the year	To end of the year	Remarks
1	2	3	4	5	6	7
Direct Receipts			Direct charges			
Total Direct Receipts			Total Direct Charges			
Portion of Land Revenue due to Works			Indirect Charges as per Part V			
Total Gross Receipts			Gross Charges			
Net Deficit (if any)			Balance Net Revenue			
GRAND TOTAL			GRAND TOTAL			

FORMS
FORM A.O. 60
(See Appendix 3, Paragraph 1)
ADMINISTRATIVE ACCOUNTS

PART I General Abstract of Financial Results of Irrigation, Navigation Embankment and Drainage Works for which Capital and Revenue Accounts are kept for the year 19-19.

No. 297

(file No. 108-AC/51)

Page 255, First Edition (1940), Page 247. First Edition (Re-print, 1950)

Form A.O. 60

Substitute the following for the existing descriptive heading of Part I, General Abstract of Financial Results of –

No. 377

Page 255, First Edition (1940), Page 247, First Edition (Re-print, 1950), Form A.O. 60

For the existing Column 15 in Part I General Abstract of Financial Results of - substitute the following:

"Indirect Receipts" (Account Code, Vol. IV, No. 377, dated 2-1-55) (File No. 248-AC/53)

		Gross receipts during the year			Working expenses and maintenance during the year inclusive of indirect charges			
Accumulated arrears of Simple interest to end of the year	Total capital invested to end of the year (column 11 and column 12)	Direct receipts	Portion of land revenue due to works	Total	Direct charges	Indirect charges	Total	Net revenue Surplus + Deficit
12	13	14	15	16	17	18	19	20
				Percentage of net revenue (column 20) invested (column 13)				
Percentage on capital outlay column 11. Gain "G". Loss "L".	Simple interest for the year as detailed in Part IV.	Net gain	Net loss.	During	During	During	Prescribed rate of interest L, as test of productivity	Remarks
21	22	23	24	25	26	27	28	29

FORMS

FORM A.O. 60 contd.

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PART IV Interest Account for and to end of year 19 -19

Interest	Amount	Net Revenue	Amount
Total Interest to end of previous year		Net Revenue realised to and of previous year	
Interest charges for the year		Net Revenue realized during the year, as per part III.	
Total Interest to end of the year		Total Net Revenue realised to end of the year as per part III.	
Balance		Balance	
TOTAL		TOTAL	

** Balance will be entered on the Interest or the Net Revenue side, as may be necessary*

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PART V Account of Indirect charges for and to end of year 19 -19.

Particulars	Amount	
	During the year	To end of the year
Capital Account		
Capitalised abatement of Land Revenue		
Leave and Pensionary Charges		
Audit and Account Establishment		
Total Capital Account		
Revenue Account		
Capitalised abatement of Land Revenue		
Leave and Pensionary Charges		
Audit and Account Establishment		
Total Revenue Account		

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PART VI Statement comparing Capital cost to end of 19 -19 with sanctioned Estimates.

Particulars	Charges against closed sanction			Current sanctions			Total charges to date against old and current sanctions	Remarks
	Expenditure against construction estimate	Expenditure against open capital sanctions	Total	Charge s to date	Amount of sanctione d estimate	Unspent balance		
1	2	3	4	5	6	7	8	9