सिंचाई प्रणाली के निष्पादन मूल्यांकन हेतु मार्गदर्शी सिद्धांत

GUIDELINES FOR PERFORMANCE EVALUATION OF IRRIGATION SYSTEM

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निष्पादन पुनरीक्षा एवं प्रबन्ध सुधार संगठन
सिंचाई निष्पादन पुनरीक्षा निदेशालय

Central Water Commission
Performance Overview & Management Improvement Organisation
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FOREWORD

Development of Irrigation Potential has been the main objective of various State and Central Governments after independence. There are around 4,000 major, medium and multi-purpose projects and thousands of minor irrigation projects in India today. With the major spurt in the development of irrigation and agricultural sectors, the country has achieved about 67% of the ultimate irrigation potential. This led the country from frequent famines and social vulnerability in the 50's to a self-sufficient and even foodgrain-exporting country, despite geometric progression in the population.

Although no project does ever function exactly as assumed at the design stage, yet improving the performance of an irrigation system could help in bridging the gap between the irrigation potential created and its utilisation and in improving the agricultural productivity of the command area. Recent studies reveal a very disappointing picture of performance of many of the irrigation schemes where due to inefficient water and land management both at farm level and at scheme level, much less could be irrigated than planned and agriculture production reached levels much below the targets. Further, in a number of cases, it is observed that maintenance of most of the irrigation systems constructed prior to independence and also of those which have been completed in the earlier plan periods, has been far from satisfactory. While per unit cost of creation of irrigation potential shows a rising trend, the cost of produces continues to be low, which has been a matter of serious concern to the irrigation planners. In view of this, performance evaluation of irrigation systems is essential in order to identify the bottlenecks/constraints leading to low performance. It is now mandatory for all the State Governments to carry out the performance evaluation of all the existing irrigation systems, whenever proposals are sent for their extension / renovation / modernisation.

Central Water Commission has the mandate to oversee and advise the State Governments suitably, for carrying out periodic evaluation of the performance of completed irrigation projects. In this endeavour, "Guidelines for Evaluation of Performance of Irrigation System" was brought out earlier in March, 1997. The present document is a revision of the earlier guidelines, discussing in detail therein various performance indicators, the process of data collection, its critical analysis and methodical evaluation of the irrigation systems, for optimal utilisation of land and water resources.

The compilation of this document has been accomplished by the dedicated efforts put in by the officers and staff of the Irrigation Performance Overview Directorate, under the valuable guidance of Chief Engineer(PO & MIO). It is hoped that this publication will be of immense use for all those engaged in carrying out the performance evaluation studies of irrigation systems in the country.

Suggestions for improvement in the content, coverage and presentation of the material are welcome.

(Suresh Chandra)
Member (WP & P) and
Chairman, CWC.

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1 Introduction

1.0 Water is a precious element without which no life can be sustained on the earth. Increased production of both food and fibre to offset the hardships of an increasing population and rising standards of life is a problem of great concern to our economic planners. Although water is a renewable resource, demand for water is ever increasing for various developmental activities, such as domestic, industrial, recreational, navigational, pisci-culture and other uses. A number of multi-purpose and major irrigation projects were taken up during the past five decades, to make India self-reliant in food grain. Since independence, India has created an irrigation potential of 8.8 Million hectare, which on an average is 1.5 million hectares per year. However, the potential utilisation has not been commensurate with the creation of the irrigation potential resulting in a large gap almost amounting to 8.8 Million hectare at the beginning of 9th Plan. Over the years, India's land resources have been exploited extensively with the result that the percentage of the total land under cultivation is one of the highest in the world. There is a very limited scope for bringing additional land under cultivation. The desired increase in agricultural production has therefore to be sought largely from multiple cropping, use of advanced techniques in application of irrigation water, and proper management of available resources. It has therefore become imperative that all-out efforts are taken to use the available land and water resources in an optimal and judicious manner consistent with sustained development.

1.1 Since huge investments have been made both in irrigation sector and CAD works, it was considered necessary by Planning Commission as well as the Ministry of Water Resources to carry out an exhaustive evaluation of the performance of major irrigation projects and CAD activities through various consultants from the country.

1.2 *Performance Evaluation* is envisaged as an auditing exercise primarily to look at the performance in a mirror at regular intervals not only to assess the actual performance to identify deficiencies if any and find a viable and economical solution for various problems. The sharp criticism which is being voiced by a section of society in regard to the economic viability of these projects, in the wake of the adverse environmental impacts like water-logging, salinity and alkalinity, deforestation, effect on flora and fauna, etc - needs to be addressed properly. It is only through periodical evaluation of the performance of Irrigation Projects, we will be able to take timely remedial measures and safeguard the system against possible sudden failures.

Formulation of projects is a continuing process in which information and lessons derived from previous experience form an important input so as to rise its quality. Evaluation of old or continuing projects involving a comparison of the intended with the actual operation provides useful feed back in future planning. Evaluation also enables planners to avoid *"compounding of errors"* and thereby prevent the continuing wastage of resources. Plan formulation, implementation and evaluation go as continuous planning process, and are closely inter-linked.

2 Need to overview the performance of the Water Resources Projects

The importance of carrying out Performance Evaluation Studies has received due recognition long time back at various national and international levels like, Public Accounts Committee, Planning Commission, State Water Resources / Irrigation Ministers' Conference, National Water Policy, Working Group on Major & Medium Irrigation for IX and X Five year plans, and externally funding agencies like USAID, World Bank etc. Some of the excerpts are reproduced below:

- *The 5th National Water Convention on the theme. "Water Resources Development Performance Overview" held at Faridabad from 25th - 27th February 1994:*

  ".....the evaluation of water resources projects should be carried out to identify the deficiencies for taking up short term and long term remedial measures."

- *Important Recommendations of National Water Policy April 2002:*

  - Para 1.6: Planning and implementation of water resources projects involve a number of socio-economic aspects and issues such as environmental sustainability, appropriate resettlement and rehabilitation of project affected people and live stock, public health concerns of water impoundment, dam safety, etc. *Common approaches and guidelines are necessary* on these matters.

  - Para 6.2: The study of likely impact of a project during construction and later on human lives, settlements, occupations, socio-econimic, environment and other aspects should form an essential component of project planning.

  - Para 9.1: ".....Irrigation Intensity should be such as to extend the benefits of irrigation to as large a number of farm families as possible, keeping in view the need to maximise production."

  - Para 9.3: "Water allocation in an irrigation system should be done with due regard to equity and social justice. Disparities in availability of water between head reach and tail-end farms and between large and small farms should be should be obviated....."

  - Para 9.4: Concerted efforts should be made to ensure that the irrigation potential created is fully utilised. For this purpose, the command area development approach should be adopted in all irrigation projects.

  - Para 9.5: Irrigation being the largest consumer of fresh water, the aim should be to get optimal productivity per unit of water.

  - Para 9.6: Reclamation of water logged/ saline affected land by scientific and cost-effective methods should form a part of command area development programme.

  - Para 20.2: There should be a system to monitor and evaluate the performance and socio-economic impact of projects.

- Para 22: "There is an urgent need of paradigm shift in the emphasis in the management of water resources sector. From the present emphasis on the creation and expansion of water resources infrastructures for diverse uses, there is now a need to give a greater emphasis on the improvement of the performance of the existing water resources facilities. ……."

- Para 23.1: Structures and systems created through massive investments should be properly maintained in good health.

- Para 23.2: There should be a regular monitoring of structures and systems and necessary rehabilitation and modernisation programmes should be undertaken.

- Para 23.3: Formation of Water Users' Association with authority and responsibility should be encouraged to facilitate the management including maintenance of irrigation system in a time bound manner.

➢ *Important Recommendations of "Working Group set up by Planning Commission on Major & Medium Irrigation Programme for the X Five Year Plan":*

a) The practice recommended by USBR (USA) is to put the Irrigation system to a periodic review of 3-4 years interval through 2-3 senior experienced professionals outside the organisation to record unbiased evaluation On similar lines, it is recommended that the Irrigation Systems be evaluated at least once in a period of 5 years in India.

b) Extension / Renovation / Modernisation (ERM) of *old Irrigation systems* executed during pre-independence period and 25 years ago should also be re-evaluated in regard to their performance etc. by the State Governments through reputed institutions like State WALMIs / IMTIs / Universities etc. (preferably by persons outside the Irrigation / Water Resources Department. of the State Govt.) in co-ordination with Central Water Commission.

c) It should be made mandatory for the State Governments to carry out Performance Evaluation Studies of all the ERM schemes preferably by a third party and got approved by a Technical Advisory Committee. The Committee shall be constituted under the Chairmanship of Member (WP&P), CWC and representatives from Water Resources / Irrigation Department/Project authorities of the State Government, Planning Commission, Ministry of Environment & Forests, Ministry of Agriculture, Govt. of India and Consultant(s) engaged for the study. Outcome of such studies as well as a status note on follow-up action on environmental concerns such as proper resettlement and rehabilitation of project affected persons, arresting water-logging and soil salinity in Irrigation commands & soil up-gradation, etc. is to be included as an exclusive chapter in the DPR of ERM Schemes while submitting the same to CWC for techno-economic appraisal.

d) In the case of World-Bank aided / financed Water Resources Consolidation Projects (WRCP) also, it is necessary that the Performance Evaluation be carried out in the same manner as mentioned in Para- a) above. At the time of

completion of such projects, the World Bank carries out a review of projects jointly with Government of India and also prepare Implementation Completion Report (ICR). Central Water Commission is to be better equipped to participate more efficiently in the detailed review carried out by World Bank.

e) Water-logging phenomena is *dynamic in nature* for which an effective *monitoring system* may be developed to observe the performance of the drainage system regularly and for taking simultaneous corrective measures as and when required.

f) In the case of new proposals, it is necessary to examine certain vital aspects pertaining to drainage viz., whether the command area proposed to be brought under irrigation falls under high /medium water-logged category or saline/ alkaline category; what are the likely impacts in the command area when the project is implemented; whether adequate provision has been kept for providing drainage network in the command and undertaking the reclamation of land where necessary.

g) It is generally experienced by the National Level Environmental Management Committee (EMC) that the safeguards as prescribed by the MOE&F at the time of clearance of the Water Resources Projects are not implemented properly during construction. In order to effectively monitor the implementation of the safeguards laid down by MOE&F the Environmental Management Organisation (EMO) of CWC be suitably strengthened .

- *Recommendations of "The National Commission for Integrated Water Resources Development Plan (NCIWRDP)": The National Commission for Integrated Water Resources Development Plan (NCIWRDP) in their report of September 1999, and the World Bank in India Irrigation Sector Review Report (Sep 1998):*

  ".... There is need to assess the performance of completed projects with reference to costs and benefits as anticipated at the time of their planning and as experienced now. The review should also cover crop pattern, water requirements, etc. as adopted in the planning stage and as per present situation. Similarly there is a need to assess the performance of old irrigation projects, which have been modernised, and also the performance of local watershed development schemes, both with regard to the physical performance of the structures as well as subsequent performance in the delivery of water. The socio-economic and environmental impacts due to these projects would also need to be studied."

- *Requirement of the World Bank for extending financial assistance*:

  "..... it is essential to carryout performance evaluation study of Water Resources Projects covering System Improvement & Turnover, Institutional Strengthening, Water Planning, Environmental Management, Participatory Irrigation Management and Rehabilitation & Resettlement etc". In order that the views of Govt. of India are properly conveyed to the World Bank, and also to cope with the international standards for getting foreign assistance, it is very essential to carry out the performance evaluation study of the irrigation system covered under Water Resources Consolidation Projects (WRCP).

3 Scope, Objectives and Approach

3.0 Scope: Monitoring/ Periodic review is like the eyes of a man who observes the activities around him conducive to the attainment of goals set out. An irrigation system manager is supposed to see through the eyes of monitoring/ periodic review and manage the system to meet the objectives and wield authority in keeping the administrative machinery on its toes and maintain agitity in responding to farmers needs. It is the bounden duty of the Irrigation Project Authority to keep a track of the happenings in the Irrigation System like climatic events, water flows, water deliveries, water use, deficiencies and induct changes on day to day basis in the implementation of the main objectives for which the Irrigation System has been created.

The purpose of any irrigation system is to enhance the economic welfare of people at large and command areas in particular. The economic welfare is manifested in higher incomes, better standard of living and capacity of investment for further development. Irrigated Agriculture forms the backbone of Indian economy, since 70% of the country's population depends on agriculture. Water distribution, which forms a strong link between the suppliers and users, has large impact on the performance of the systems. Efficient and equitable distribution of water is the most important requirement of management of irrigation projects. Improving irrigation systems from the headwork's to outlet into the farmers' field has to be paid adequate attention. Poor performance leads to many unfavourable effects such as low yields per unit of area and / or per unit of water. The performance evaluation of system as a whole or of any of its components will go long way in enabling the concerned authorities to take timely and appropriate remedial measures and in enhancing present system performance and plan a proper strategy for future improvements in management and operation. Performance evaluation of an irrigation system is a stock-taking exercise to methodically analyse the functioning of the system and assess the achievements of the system, in which large investment of money and human efforts have been made. This evaluation process identifies the component of the system, which is not performing well, and will bring to focus the deficiencies in project planning and its implementation. Thus it helps to improve techniques of project formulation and implementation to ensure optimum performance.

3.1 Objectives: Objectives of evaluation of any irrigation system are to determine if the purpose for which the system has been set up, is achieved or not. It is necessary to know:

- if the planned irrigated area has received *required water supplies at the proper time and the distribution has been equitable*.
- if the system components are capable of delivering the required quantity of water, whether each component is being maintained and operated properly, that the canals run as per programme.
- if the crops as per original (or revised plan) are being produced and that the yields are appropriate.
- if investments made by the farmer or by the state are achieving desired roles of return.

The purpose of evaluation is to quantify the achievements and compare them with original or revised project objectives, and to identify specifically those areas with deficiencies so that steps may be taken in time for improvement,. Evaluation also helps in improvement of future design of new systems *to obtain optimum output from investments*.

3.2 Approach and Parameters:

The approach to assessment of performance of any irrigation system should be such that it covers most of the vital components of the system in regard to all its *aspects and purposes*. A reservoir or a dam should be capable of storing the required quantity of water, spill flood discharges, and deliver the required quantity of water for irrigation. A diversion work should be able to pass the flood discharge and divert the required quantity of water to the canal system. All canals should be able to carry the full designed discharge. All the control and regulating gates, canals structures like falls, flumes, super-passages etc. should be able to *function as designed*. The minor which may have uncontrolled pipe or flume outlets is the most important and sensitive component of an irrigation system. It has to run without any cross control works and has to maintain desired discharge and depths so that all the outlets receive the required quantity of water for the required period of time. Equity of distribution also has to be maintained on each minor between head and tail outlets. Efficiency of the system depends on proper operation and regulation of various components so that *all the areas in the command receive the needed supplies at required time for optimum production of crops*.

3.3 Base for Comparison:

The evaluation of performance for any system has to be made with reference to a certain base. In the case cf irrigation projects, this would be obviously the objectives or targets envisaged at the time of design and implementation. It could be those on the basis of which the project was approved, or those on the basis of which the project was revised during execution and finalised at the completion stage of the project. It is not necessary that preparation of a formal completion report be a precondition to the start of the evaluation process. The scope of the project in the original report or as revised from time to time is always known and should be taken as the starting point for performance evaluation.

It is however worthwhile to note that sometimes, comparison with the targets taken from the project report *may not reflect the true performance* because annual inflows or availability of water may differ widely from those projected at the time of planning, or some other changes may have been introduced at subsequent stages. Therefore, the performance of an irrigation system gives *a more realistic picture* if it be evaluated with reference to the targets projected for a particular season. For example, availability of water before the Rabi season is generally known while the pattern of irrigation and the crops is decided before the season starts. Another reason could be that the infrastructure is not complete and that full irrigation potential of the project has not been reached.

Therefore, it should not be difficult to fix targets for the season and see the actual performance with reference to these targets. At the same time, assessment only with reference to seasonal projections may also not reflect true performance. There may be

some complacency or lack of efforts on the part of managers to achieve results as envisaged in the project report. It is therefore considered that the assessment should be made on both counts i.e. with reference to the project report and with seasonal projections. If the achievements fall short of the objectives provided in the project report consistently for many years, there will be a need of looking back at the original project to review and revise its scope, or to carry out some additions and alterations.

3.4 Performance Indicators:

In order to decide whether the system has performed as it should, it is necessary that an agreed set of indicators, which represent the performance of different components and different aspects, be identified. These indicators should include irrigation performance objectives such as reliable water delivery and its utilisation for crop production. The characteristics that are vital for successful management are equity, reliability, adequacy, regularity and durability.

Irrigation projects vary widely in size, scope and levels for data collection. One list of variables to be collected and processed for all projects is not possible. *Certain variables that are appropriate for one project may not be so for another.* Variables that can be measured in one environment may not be possible in another. Operating experience can help listing of indicators useful for evaluation *in a majority of cases*. Generally, meaningful indicators for evaluation should meet the requirement of the following criteria:

- Can it be accurately measured under prevailing conditions, and at acceptable cost?
- Does the measure indicate "the state of a condition", in a specific and precise manner?
- Is it an unbiased measure?

Accurate measure of indicators below the outlet is difficult, especially when dealing with farmer communities. Crop yields can be measured fairly accurately by crop cutting experiments, but it requires considerable time and skill. Income data is a very important indicator required for many evaluations, but accurate measurement of small farm income is extremely difficult.

The delivery of water in the system may be specific, but the measure of output or crop production achieved is less specific, as it could well be a result of climatic variation, or inputs other than water, thus showing that input is specific while output is not precise.

It is desirable to measure unbiased indicators reflecting true conditions. However, while measuring changes over time, some bias may not be critical if it remains constant in absolute or relative terms. For example, the farmers' estimate of crop production may be biased, but if the relative bias remains constant, the proportionate change of the estimate over time will more or less reflect the proportionate change in crop yield.

Proper irrigation system management requires that the effect of current operations be evaluated against the original criteria set for the project or to be taken based on amended criteria due to changes or modifications of facilities. Procedures for action on results of evaluation are necessary for improving operational efficiency of the system. The evaluation report should bring out the priorities for changes in operations,

and scheduling and the most needed maintenance. Key indicators that should be evaluated for analysis are :

- *Conveyance System Performance* :

  - reservoir seepage
  - canal conveyance efficiency
  - canal operations loss
  - project operational loss
  - project over-all efficiency
  - adequacy of water delivery

- *Maintenance system of civil works*:

  - Canal
  - drains
  - water control structures.

- *Drainage performance* :

  - watertable fluctuation, seasonal and long term
  - drain effluents quality changes by area
  - drainage requirement change by area
  - water-logging and soil salinity changes (by area)

- *Below the outlet* :

  - irrigation potential created and utilised
  - on farm water use efficiency
  - conjunctive use of water
  - adequacy of irrigation method
  - adequacy of crop selection
  - production technique for irrigated agriculture
  - soil management and erosion control
  - economic result of management practice
  - equity and dependability

- The following criteria are also important and may be covered in the evaluation process:

  - organisation of water distribution
  - communication system
  - cost of distribution of water
  - incentives and mal-practices
  - participatory irrigation management (PIM) and training programmes for farmers.
  - monitoring and data collection.

4. Various Steps involved in Performance Evaluation and Monitoring

4.0 Selection of the Project:

Among a whole range of projects, it would be desirable to pick up those with large gaps in potential created and potential utilised. The project so selected, should be one which is in operation at least for a period of 5 years after construction, or one for which no evaluation had been carried out for the past 5 years or more. There is a general apprehension that performance evaluation is likely to expose the faulty planning and defective construction, which might make project authorities vulnerable to technical scrutiny. Such doubts are to be dispelled outright and even an inadvertent action or latent desire pointing towards them would adversely affect the evaluation process. This could lead to evasion of co-operation and develop a tendency to conceal vital information required, defeating the very purpose of the study. Prior concurrence of concerned State Government explaining the objective, necessity and broad time schedule is desirable. Eliciting their views and convenience would be useful for smooth conduct of the study. The exercise should not be merely of academic interest but should be of real practical utility to bring out the deficiencies for affecting improvements in irrigation projects constructed with large investments.

4.2 Composition of Evaluation Team:

Success of study to a great extent depends upon the quality of evaluation. The team should have good knowledge of the subject, unbiased approach, knack to extract information, scientific attitude, imagination, perseverance, quick grasping and clarity of the purpose. A team of competent engineer, economist, agronomist and sociologist would be an ideal combination for evaluation studies. The engineer should possess expertise in hydrology, irrigation hydraulics including engineering structures and instrumentation. The irrigation project is an investment activity in which financial resources are expended to create capital assets that produce benefits over an extended period of time. The costs are also incurred on maintenance to keep the project operational. The role of economist is important to determine the usefulness of the investment in terms of better water delivery for increased production. The irrigation system comprises of several components each having specific starting point and a specific ending point. Each component is intended to accomplish specific objectives With the introduction of irrigation, the cropping pattern and the cropping intensity invariably change. The trend of change, its effect on irrigation water requirement and water use efficiency is to be considered for which the role of agronomist is useful. In certain cases, the farmers' committees or associations are responsible for equitable distribution of water, O&M of agreed part of the system and realisation of water charges etc. The sociologist is expected to go into these aspects for better appreciation of the social problems. . The team for evaluation should therefore be carefully drawn from various disciplines and it should be able to draw concept boundary for each component and assess its functional performance. Continuity of the same team throughout the study & reporting period is necessary.

4.2 Frequency of conducting Performance Evaluation Study:

i) USBR (USA) recommends a practice of putting the Irrigation System to a periodic review of 3-4 years interval through a group of 2-3 senior experienced professionals outside the organisation to record unbiased evaluation. As per Indian conditions, it is desirable that the irrigation systems be critically evaluated at an interval of at least 5 years.

ii) Extension / Renovation / Modernisation (ERM) of old irrigation systems executed during pre-independence period or 25 years ago are also to be re-evaluated in regard to their performance etc. by the State Govts. Through research institutions / universities / consultants or autonomous bodies like State WALMIs / IMTIs (preferably by agencies outside the Irrigation / Water Resources Department of the State Govt.) in co-ordination with Central Water Commission.

4.3 Monitoring of Performance of Irrigation Systems by Centre:

On behalf of Union Ministry of Water Resources, Central Water Commission (CWC) is monitoring various studies and is taking stock of irrigation performance related issues in completed projects and is critically reviewing the project performance, project impact, its use and abuse leading to increased productivity or degradation of land etc. Apart form the performance evaluation of irrigation systems, CWC has also been carrying out i) specialised *studies on various impacts of irrigation systems on socio, agro, environmental and economic issues*; and ii) *benchmarking of selected irrigation systems* in the country. The objectives of these studies are briefly summarised below:

a) Assessment of various Impacts of Irrigation Systems:

No developmental activity is possible in the world, without altering the surroundings, and the development of irrigation is no exception to this. Thus, rapid development in irrigation and agriculture generated its own ecological, socio and agro economic ramifications. Some of these impacts are positive – like high and rising levels of farm incomes and employment, better social infrastructure, hydro-power development and industrial growth; while the others are negative – like water-logging and salinisation of the soil, deforestation, spread of water-borne diseases at some places and adverse environmental impacts on the wild life, flora and fauna in the region, etc. But, many of the adverse impacts are manageable if proper and timely corrective measures are taken during the implementation of the projects. In recent years, water resources projects have come under constant attack from some quarters of the society whereby the adverse impacts are being blown out of proportion. The criticism levelled against the water resources projects in most of the cases is neither based on scientific data nor established facts. In order to make scientific and actual assessment of the impacts of the irrigation systems *(both positive as well as negative)*, and also ensure a sustainable and eco-friendly environment, the Union Ministry of Water Resources/ Central water Commission has also been continuously assessing various Impacts of Irrigation Systems on socio, agro, environmental and

economic fronts in the country. The Guidelines in this regard were separately brought out by Central Water Commission.

b) **Benchmarking of performance of various Irrigation Systems:** While the Performance Evaluation of Irrigation System (it is done for a particular irrigation system at a time) lays *emphasis on bridging the gap between the irrigation potential achieved over that created,* the Benchmarking process involves identifying certain common parameters among *similar irrigation systems,* choosing the best or an Ideal Irrigation System which excels the other systems (with reference to the identified parameters), and then comparing with the ideal system so as to find how best the other systems too could be brought at par with the ideal project. *This is a continuous process in which efforts are made to bridge the gap among similar irrigation systems in the range.* As a matter of fact, both performance evaluation and benchmarking of irrigation systems, ultimately aim at maximising the crop production per unit of the command area or per unit of the available water. The benchmarking of irrigation systems has successfully been carried out in countries like Australia. On similar analogy, in India, the benchmarking of a few selected Irrigation Systems is being undertaken on pilot basis by Central Water Commission/ MOWR, in close co-ordination with the concerned project authorities. Guidelines in this regard have been finalised and issued separately by the *Indian National Committee on Irrigation and Drainage (INCID).*

The scope of the present Guidelines is limited to the *Performance Evaluation i.e., System Performance of the Completed irrigation Systems* only.

Various steps involved in data collection, their sample formats and the analysis is explained in sections 5 to 7.

5 Data Collection

5.1 Primary Data:

The following primary data and information shall be collected for the overall command area:

- Maps:
  - i) Index map on a scale of 1:2, 50,000
  - ii) Maps showing Irrigation canal networks, major drainages and other features of the command on a scale, as available.
  - iii) Soil survey maps, as available
  - iv) Maps showing tubewells as also ground water observation wells on a scale of 1:2, 50,000 or as available
  - v) Village maps to a scale of 1:4,000 for commands of selected minors, showing irrigation network and other physical features.

- Reports
  - i) Project reports as also completion report , if available
  - ii) Reports on cropping patterns and soil survey reports, if any
  - iii) Reports on appraisal studies, if available
  - iv) Irrigation manual of orders, professional manuals, etc.

- Physical Data

  a) Meteorological data

  - i) Rainfall - Normal monthly rainfall data for the study command
  - ii) Normal monthly evaporation and evapo-transpiration data for the selected area and agro-climatic data, if available

  b) Hydrologic data

  - i) Water availability at head-works- monthly data for last 5 years
  - ii) Monthly regulation data for overall system in various distributary networks and for selected minors for last 5 years
  - iii) Data of seasonal water table fluctuations and of depths of water table in the observation wells, (if available)
  - iv) Data on pumping tests on wells, (if available)
  - v) Discharge data of regenerated water in drains, (if available).
  - vi) Water quality data (if available).

- *Functional Data:*

  a) Agronomic data:
  - i) Agronomic practices, crop water requirements
  - ii) Irrigation practices

b) Resource use – land use and cropping patterns for overall command for the last 5 years.

c) Details of data of Irrigation channels:

i) Gross and cultivable commands on the distributary networks
ii) Water scheduling and rostering of canals for last 5 years
iii) Public and private tube-wells functioning in the command for last 5 years
iv) Irrigated area – crop-wise for various distributary networks and for selected minors and on public tube-wells for the last 5 years.
v) Irrigated areas from tube-wells and drains in the project command for last 5 years

d)
- Details of water-logged areas and salinisation / alkalisation in overall command
- Data on reclamatory measures taken by project authorities, if any

e) Rules and procedures for scheduling supplies among canals:

- Whether Irrigation schedules are continuous or intermittent and whether uniform or varying over the command
- Whether canals operate at full discharge or at lesser or more discharge
- Opening and closing dates for the canals and closure periods

a) Rules and procedures and methods for distribution of supplies among farmers in the outlet commands

g) Rules and procedures for regulation and control of irrigation supplies:
- Operation manuals
- Operation monitoring system – Management Information System (MIS) & Decision Support System (DSS).
- Regulation and control system and its structure
- Interference by the farmers with canal flows and Irrigation schedules
- Interference from outside agencies

h) Operation and Maintenance norms
i) Operation and Maintenance funds
j) Organisation for regulation and water management :
- O&M staff, trained and untrained
- Tenure of O&M staff and changes in posting
- Powers of O&M staff to deal with infringements and interference by farmers and legislation in force, if any
- Staff incentive structure for O&M
- Discipline in operation by staff

5.2 Secondary Data:

The data as outlined in para 5.1 will be useful for detailed study. Additionally critical data would, however, be necessary for performance evaluation of the system. The

additional data as necessary may be obtained by carrying out *field observations and investigations* on main canal, on three representative distributaries – one in head reach, one in central reach and one in tail reach, and in the commands of one or two minors on each of three representative distributary systems, selected on the basis of parameters of hydrologic soil classification, groundwater, drainage, etc.

- The following field investigations and observations are considered necessary:

  i) Survey for inventory of wells / tube-wells and for ascertaining capacity / discharges and annual drafts for outlet commands of selected minors. Assessment of annual drafts will be based on reconnaissance surveys and queries in the field. Water quality of groundwater may also be ascertained.

  ii) Operation & conveyance losses on stretches of main canal, representative distributaries and selected minors and water courses - (Conveyance losses may be measured by inflow – outflow method).

  iii) Sample surveys in both crop seasons for irrigation methods, depth and frequency of irrigation, effective rainfall and crop yield for principal crops vis-à-vis soil conditions, nature of water and other agricultural inputs, size holdings etc. in typical canal irrigated fields on sample outlets.

  Similar observations are necessary for relevant crops for each type of irrigation facility (well irrigation, canal irrigation, and canal irrigation supplemented by well irrigation).

  iv) Sample survey for cropping patterns in irrigated areas and in outlet commands in three outlets on each selected minor and their comparison with department records and design expectations. The survey will be based on reconnaissance and queries in the field.

The Sample Data Formats/ Questionnaire given at Formats-I to VIII may please be referred to.

6 Review and Analytical Study of Data

6.0 Macro-level study

Review of State Policy and objectives in regard to distribution of available supplies among farmers and cropping patterns adopted and crops grown, and of the effect and adequacy of irrigation and related Acts and Supplemental Rules framed by the State Government on the objectives. Enforcement of codes and their match up with the real situation may be reviewed. (History of the project may also be referred so as to ascertain some of the issues involved in completion of the project).

6.1 Studies for evaluation of performance for existing irrigation system

- Water availability and utilisation –
  - Pattern and extent of surface water availability:

The data of surface water supply availability of the head of barrage main canal systems and that passed on will be collected and compared. If there are deviations, the reasons would be ascertained and measures necessary for affecting availability be indicated.

- Groundwater development in the command:

Review will be made of ground water development in overall command of the system.

- Status of groundwater development through private and public wells will be ascertained. The conjunctive use system as prevalent and its efficacy will be studied. It will be examined if any change in policy is required.

- Review of Irrigation System:

(i) Main Canal and distributary canal systems

- (Canals and off-takes) with respect to adequacy of capacity of canals and regulators and other structures.
- Long sections and cross sections of main canal and irrigation distribution network.
- Layout and geometry of irrigation canal network, lined and unlined and their capacities at heads and strategic points
- Canal roughness and conveyance and operation as well as runoff losses in channel system
- Location and details of head and cross regulators and their control systems.
- Location and capacities of escapes and outlets for various water levels in canals and distributaries.
- Dummy regulators and drainage arrangements in lined channels.

(ii) Distribution systems in outlet commands:

- Outlets (size and type), discharge capacities and command areas
- Pattern of distribution of supplies among outlets.

- Adequacy of watercourses and field channels in outlet commands and their state of maintenance.
- Adequacy of OFD works (field channels – lined & unlined, chak roads and field drainage) and state of maintenance of OFD works.
- Status of land levelling and land shaping of fields.
- Estimation of seepage and runoff losses in watercourses and field canals.

(iii) Drainage System:

- Adequacy of the network of connecting and primary drains
- Adequacy of the capacity of drains
- State of maintenance

Provision of lining canals may be suggested from consideration of conservation of water or maintenance and safety. The selection of reaches for lining of canals and of outlet commands for lined water courses would be based on data for conveyance losses obtained from field experiments that could be saved from provision of lining. If any Master Plan for the system had already been planned, under special area programme, composite project or any other type pf programme, the remedial measures planned, details such as canals constructed/ future programme and area freed/ likely to be freed etc may be indicated. The water-logged areas and various phases of drainage programme shall be shown in the Index Plan. The following details may be given:

➢ Water-logging problem

- From study of depth of groundwater table maps, the effect of irrigation on ground water level over time and the areas prone to water-logging will be ascertained

- Soil salinity / alkalinity problem
  The areas with salinity / alkalinity problem will be identified on the basis of reconnaissance surveys and contact with public and officials. The data available, if any with the project authorities in respect of water-logged / saline lands, the reasons thereof be ascertained. Provision of funds to mitigate the problem and remedial measures proposed by the project authorities and the action research programme will be critically analysed.
- Water quality of drainage water
  Water quality of drainage water will be ascertained, and seen as to what extent it can be reused for irrigation and other purposes.

➢ Water allocations & scheduling plan

- Review of available supplies, canal regulation and water scheduling procedures vis-à-vis weather conditions, frequency of irrigation and irrigation methods for predominant crops.
- Review of scheduling of supplies by farmers vis-à-vis optimum timings of irrigation.
- Review of decision making process in water allocation about adequacy and scope of decentralisation of certain functions.

➢ Monitoring System and Communication Network

- Review of system of data collection, processing and analysis in respect of water availability, scheduling and supplies, and their utilisation in regulation and comparison with actual situation.
- Review of communication system in respect of adequacy and reliability
- Agricultural Performance:
- Cropping patterns, irrigated crop areas and intensities
- Supplies reaching fields and those consumptively used by crops
- Crop yields and agricultural income
- Extent of groundwater and drainage reuse in meeting agricultural demand.

➢ Evaluation of reaction of farmers to the performance / impact of irrigation project with respect to :

- Water availability
- Adequacy of OFD programme
- Adequacy of inputs and support services
- Adequacy of water distribution system among farmers
- Information to farmers about operating procedures, scheduling of supplies, opening and closing dates for the channels and closure periods.
- Arrangement of co-ordination and consultation among farmers and officials.
- Attitude of the farmers to the project

The key constraints in the system are to be analysed and the works to be remodelled or new works to be provided will be identified.

7 Performance Evaluation of Irrigation System

7.1 *Macro-level study will be carried out and evaluation of performance of existing irrigation system as described in Section 6 will be made.*

7.2 *Review of performance in respect of design, operation and maintenance of irrigation systems:*

The available data of irrigation system will be studied and following questions will be considered:

- Have the design expectations about water availability been fulfilled?
- Have actual water allocations been comparable to those complied by operation rules?

(The conveyance losses in the canals and watercourses based on measurements carried out in field will be adopted).

- Have design canal and off-take capacities proved constraint and how do the prevailing capacities compare with design?
- How has the system been maintained and how has it affected system performance? (State of maintenance would be ascertained by study of longitudinal sections and of logbooks of works based on inspections and surveys carried out during operation as well as closure periods).
- Have the other resources of water (ground water, tanks and drainage reuse) been integrated with the canal system and what is their contribution to the water availability?
- How well are system operations monitored and reported and what arrangements are made for regulating and controlling the system?
- How do actual irrigated areas compare with design expectations?
- How closely are the present operating rules and procedures, the specified irrigation schedules among canals, opening/ closing dates, distribution of supplies among outlets and farmers, and cropping calendars been followed.
- How do the cropping patterns and intensities compare with design objectives and to what factors are the differences attributable?
- Do water-logging and salinity conditions exist in some of the areas? Are these due to inadequacy or lack of farm agricultural drainage system and connecting and primary drains?

  (The waterlogged areas and other areas where water table is rising will be identified by review of groundwater table data in the command area, available with groundwater investigation organisation. The information of soil salinity/ alkalinity will be collected from block level supplemented by study of the soil survey data as available and by reconnaissance survey).
- Is information to farmers made available about operation procedures, opening and closing dates, and irrigation schedules?
- Is land development programme adequate? What is the organisational set up for implementation of the programmes?

- Do the farmers interfere with control structures, canal flows, irrigation schedule?

7.3 Review of Status of Water and Crop Management:

The following information would be furnished:

Review of facilities and organisation for agriculture input services:

- What is the present status of water management system for assessment of irrigation needs, use of weather forecasts in such assessment, organisational set up and communication system, of management information and reporting system and the regulation and operation system of canal supplies? Are there adequate facilities for education of beneficiaries and management staff for affecting better use of the available supplies?
- What is the status of crop management i.e. organisation and programmes of agricultural extension services including plant protection measures, and research programmes and their infrastructure? What is the extent of association of universities and research institutions in the research programmes?
- What is the status and adequacy of marketing facilities such as location of markets, network of roads and transport?
- Is there proper arrangement of co-ordination and consultation among farmers and officials? To what extent are the farmers involved in the water management and maintenance of watercourses, field channels and drains?
- Is the project covered under the Centrally sponsored Command Area Development Programme(CADP)? If so,

    - What is the status of On-Farm Development (OFD) Works in regard to:
        - -selection and introduction of suitable cropping patterns
        - -development of ground water to supplement surface irrigation
        - -development and maintenance of main and intermediate drainage system
        - -provision of ratational water supply (warabandi)
    - What is the status of Adaptive Research for evolving suitable soil-water-crop relations and management techniques suitable to the condition of farmers' fields?

8 Preparation of the Report

The report has to be as comprehensive as possible, and shall be presented in a manner that the planners, decision-makers and the project authorities are convinced of the genuine issues brought out by the evaluators. It should discuss both the positive as well as negative aspects in an unbiased manner and should project the ground realities. The information shall be duly supported by maps, drawings charts, and pie-diagrams where necessary, to make the report more illustrative. The report should rather supplement studies already carried out (either of certain component or of the whole system) by the project authorities, if any. The contents/ chapters of the report are broadly indicated below:

- *Executive Summary*:
  - containing a gist of the report in a nutshell, highlighting the important issues in not more than 3-4 pages.
- *Salient Features:*
  - containing the relevant salient features covering invariably the parameters selected for evaluation study and highlighting the people/ area benefited, stages of implementation, any extension/ modifications, etc.
  - an Index/ Location Map and a map showing the head-works and canal distribution network and command area (canal reaches that were found defective during the course of inspection and those reaches requiring immediate repairs/ attention, areas that suffer from water-logging/ salanity problems etc. shall be distinctly marked, with suitable references).
- *Background:*
  - a brief history of the project, various stages of implementation, extensions/ renovations/ modifications that were felt necessary and done in the past if any, etc.
  - write-up on the strategies, general irrigation development in the state, policies of the State Government with reference to water resources development and irrigation planning, inter-state water sharing arrangements, tribunal awards if any and the like.
- *The Project & Project Area:*
  - type of the project (major/ medium) and its objectives, year of construction, scope of the project, brief description of various components of the project, water availability, investment cost & maintenance, annual recoveries,

special problems inherent in the project like environmental, drainage, rehabilitation and resettlement etc.

- Gross and Culturable Command areas, year-wise development of irrigation, cropping pattern and agricultural practices, pre and post-project scenarios, any other specific problems encountered during, during or after construction of the project.

- *Review and Analysis of the data/ information collected and performance overview of various components of the project, farmers' response, participatory irrigation management, issues relating to Operation and Maintenance, availability and adequacy of funds, etc. (as explained in Section 6 earlier)*

- *. Evaluation of Performance of the Irrigation system as explained in Section 7.*

- *Appendices – including the information/ data collected during the course of interaction with various state government departments/ project authorities/ farmers' association, and that during the course of discussions with the local farmers, etc.*

- *Constraints and Limitations:*

  - various constraints covering issues like time, organisational problems, inadequacy of data, funds, poor response from the interviewees etc.

- *Findings and Suggestions:*

  - this chapter should not normally exceed 4-5 pages. While the findings should highlight positive as well as negative aspects in an unbiased way, the recommendations/ suggestions should not be far too many. They are to be specific and to the point, indicating invariably the possible remedial measures. It should always be kept in mind that the objective of carrying out the performance evaluation study is not to make the project an ideal model, but tc enable the project authorities take timely and necessary remedial measures wherever required so as to optimise the benefits from the project, with the available resources.

9. SAMPLE DATA FORMATS

FORMAT-I

PERFORMANCE EVALUATION - RESERVOIR CAPACITY

1. Name of the Irrigation Project :

2. Name of the Reservoir :

2. a) Reservoir Area (sq m) :
   b) Catchment Area
   c) Land use in catchment :

3. Reservoir levels & capacities as designed:

Levels (m)	Capacities (cum)

4. Rules curve (Target Level) for filling and depletion of reservoir :

5. Reservoir levels & capacities as achieved since construction

Year	Levels (m)	Capacities (cum)

6. Seasonal flows (th cum)

a) Monsoon	Inflow	Spillage	Releases	Evaporation loss
July				
August				
September				
October				
b) Non-Monsoon				
November				
December				
January				
February				
c) Summer / Dry months				
March				
April				
May				
June				

7. Comparison with assumed / designed inflows at project preparation stage & actual inflows.

8. Reasons for variation

9. a) Envisaged uses at the time of project formulation with allocation earmarked for them.

   b) Break-up of actual releases for diverse uses:

   - Drinking
   - Irrigation
   - Power Generation
   - Industrial
   - Navigation
   - Ecological purposes
   - Others (if any)

   c) Comparison of releases for irrigation with the actual demand (season-wise).

10. Reservoir Sedimentation

a)	Assumed – Area Capacity
b)	Actual Area – Capacity
c)	Loss in capacity & likely effects
d)	Years of sedimentation study

11. Water Quality

a) Period of study and agency
b) Physical, chemical & bacteriological contamination levels.
c) Reasons for quality deterioration
d) Measures taken to improve the water quality if any

12. a) Reservoir Operation, release & regulation method (season to season)
    b) Measures for control of water losses due to seepage, leakage and evaporation.

13. Any other relevant information.

Reporting Officer

Date :

Evaluating Officer

Date :

FORMAT-II

PERFORMANCE EVALUATION – HEADWORKS

1. Name of the Irrigation Project :

2. Name of the River :

3. Location of Headworks: State, District, Taluk, latitude & longitude

4. Type of headworks with structural details:

   a) Dam
   b) Barrage
   c) Weir

5. Year of completion & construction cost

6. Operation system for water releases, their sufficiency and efficiency

7. Improvement or modernisation, if carried out after completion with all details (including year & cost):

8. Maintenance information after completion of project regular maintenance, special repairs, details of staff involved & their wages / salary component, yearly cost.

Type of Work		Cost (Rs)		Total Cost (Rs)
Routine repairs	Special repairs	On works	On Salary	

9. Special problems, if any.

10. Any other relevant information on Headworks not covered above but considered necessary to mention.

11. Source of Information

Any other relevant Information

Reporting Officer

Date :

Researcher / Evaluating Officer

Date :

FORMAT-III

PERFORMANCE EVLAUATION - CONVEYANCE SYSTEM

1. Name of the Irrigation Project :

2. Name of Main Canal / Distributary / Minor:

   i) Year of construction
   ii) Cost of construction

3. Whether Canal Operation at the release structure is :

   a) Automatic
   b) Manual
   c) Any other (please specify)

4. Total length of canal / distributary / minor (km) :

5. Whether Canal cross-section throughout the length is uniform or variable:

6. Designed canal dimensions at each uniform cross section:

   a) Cross-sectional dimensions
   b) Wetted Perimeter
   c) Designed full supply level (FSL)
   d) Free board
   e) Length of Uniform section
   f) Canal gradient in each irrigation section

7. Designed discharge at FSL:

8. Maximum attained supply level in each uniform cross-sectional reach :

9. Maximum attained discharge :

10. Conveyance efficiency in different reaches :

11. Whether the canal is lined or unlined :

12. Type and length of lining :

13. Conveyance losses in vulnerable locations (in m^3/m length of canal in Rabi and Kharif season separately) :

    a) Seepage
    b) Leakage
    c) Unauthorised withdrawals & measures to check such withdrawals
    d) Drainage problems on account of losses including the extent of areas affected by water-logging during the last 4-5 years.

14. Transit withdrawals for other population benefited:

a) Type of use and area / population benefited
b) Location
c) Frequency / quantum of withdrawal
d) Duration of withdrawal (in hours)
e) Authority allowing withdrawals
f) Authority monitoring withdrawals
g) Arrangements for such withdrawals
h) Recovery of water cost (in Rupees)

15. Number of canal outlets for irrigation distribution / supply

a) Location of outlet
b) Type of outlet
c) Capacity of each outlet (in cum)
d) Frequency of release through each outlet
e) Duration of release (in hours)
f) Arrangements for measuring / metering the flow
g) Area for Irrigation by each outlet (as per design)
h) Area actually irrigated

16. General condition of the canal / distributory / minor and other structures enroute (specify chainages and the length affected):

a) Breaches or cracks:
b) Siltation – specify length affected and depth of siltation.
c) Excessive vegetation causing flow obstructions
d) Bathing / washing points
e) Deterioration of canal shape(specify chainage)
f) General soil condition and stability of banks

17. Water Quality:

a) Effluent discharge, if any, with location
b) Source of effluent – domestic, industrial, any other
c) Water quality monitoring arrangements, if any
d) Measures taken up if any to check objectionable effluents

18. Any other relevant information / comment:

Reporting Officer

Date :

Evaluating Officer

Date :

Note : This form can be used for main canal, distributors & minors after deleting the names for which information is not recorded.

14. Transit withdrawals for other population benefited:

a) Type of use and area / population benefited
b) Location
c) Frequency / quantum of withdrawal
d) Duration of withdrawal (in hours)
e) Authority allowing withdrawals
f) Authority monitoring withdrawals
g) Arrangements for such withdrawals
h) Recovery of water cost (in Rupees)

15. Number of canal outlets for irrigation distribution / supply

a) Location of outlet
b) Type of outlet
c) Capacity of each outlet (in cum)
d) Frequency of release through each outlet
e) Duration of release (in hours)
f) Arrangements for measuring / metering the flow
g) Area for Irrigation by each outlet (as per design)
h) Area actually irrigated

16. General condition of the canal / distributory / minor and other structures enroute (specify chainages and the length affected):

a) Breaches or cracks:
b) Siltation – specify length affected and depth of siltation.
c) Excessive vegetation causing flow obstructions
d) Bathing / washing points
e) Deterioration of canal shape(specify chainage)
f) General soil condition and stability of banks

17. Water Quality:

a) Effluent discharge, if any, with location
b) Source of effluent – domestic, industrial, any other
c) Water quality monitoring arrangements, if any
d) Measures taken up if any to check objectionable effluents

18. Any other relevant information / comment:

Reporting Officer

Date :

Evaluating Officer

Date :

Note : This form can be used for main canal, distributors & minors after deleting the names for which information is not recorded.

FORMAT - IV

PERFORMANCE EVALUATION – ORGANISATIONAL / OPERATION AND MAINTENANCE (O&M) ASPECTS

A) Organisational:

1. Name of the Project :
2. Name of the Department & Ministry :
3. Administrative Formation (mention the head quarters and their distance from the project):
   a) Chief Secretary
   b) Secretary
   c) Deputy Secretary
4. Technical Head of the Department & Headquarters:
5. State if project level co-ordination committee exists. If yes, its composition:
6. Any Legislative / Statutory measures taken by the government for Irrigation Sector & applicable to the project under study:
7. Regional / Zone Technical Head, headquarters & distance from project site:
8. Circle head, headquarters & distance from project site:
9. Divisional head, headquarters and distance from project site:
10. Sub-divisional head & headquarters:
11. Supervisory arrangement like JE / overseers etc. for each major component of the project:
12. Officer in charge for
    a) Reservoir operation :
    b) Canal & conveyance system :
    c) Maintenance & repairs :
    d) Farmers grievances :
    e) Measuring flows :
    f) Raising water bills
    g) Realisation of water charges and methods prescribed for it:
    h) Statement of charges realised till project inception along with arrears:
13. Level at which project related discussions are taken:
14. Level at which the implementation of decisions is monitored:
15. Level at which the decisions are implemented:

16. Project level inter-departmental co-ordination committees constituted or not. If yes, who co-ordinates, how often they met and their effectiveness.

17. Other methods of interaction & co-ordination with water users if any.

B) Operation and Maintenance:

1. Name of officers in-charge of O&M for various components

2. Maintenance norms for different components of the project

3. Maintenance schedule & periodicity (both for regular and special repairs)

4. Number of persons employed with their designation for various operations during different years.

5. Actual requirement of funds for O & M made against projected requirement and annual expenditure incurred (component-wise) in past 5 years.

6. Physical condition of different components of the irrigation system.

7. Whether the staff employed is in excess or less than actual requirement.

8. Is the officers/ staff in-charge of O&M properly trained to meet with any emergency situation / crisis.

Any other relevant information

Reporting Officer

Date :

Evaluating Officer

Date :

FORMAT-V

PERFORMANCE EVALUATION - COMMUNICATION SYSTEM

1. Name of the Project :

2. How are the Notices/ Circulars issued for

   - Water delivery schedules
   - Time & Periods of supply crucial to the farmers in taking decisions about crops, Irrigation Area etc.
     - Display on Notice Boards
     - Local Newspapers
     - All India Radio/ Doordarshan

     (It is likely that the broadcast on AIR or notices displayed on TV screen may not be followed accurately. Hence repetitions may be essential to attract the attention of the listeners/ viewers requesting them to obtain further details from the irrigation officials concerned).

3. Type of communication system used & year in which installed, at various levels :

   a) E-mail , internet
   b) Satellite based
   c) NICNET facilities
   d) Wireless system
   e) Walkie-Talkie
   f) Telephones (Number with FAX, STD facility / Ordinary)
   g) Telegraphic (address)
   h) Ordinary mail
   i) Special messenger

4. Inter connectivity between project offices at different levels

5. How orders are passed (different channels)

6. How project related problems are brought to the notice of higher authorities

7. General types of problems

8. How much time is taken to receive instructions / guidance after the problem is posed or orders passed.

9. General effectiveness of the communication system on project performance.

10. Whether the existing communication system is adequate or does it require any improvement

11. Types of project roads & lengths maintained by the department

12. Condition of roads and traffic load

13. Mobility of project staff motorbikes / vehicles provided by the department and their condition

14. Incentives if any for using own vehicles

15. Any other relevant information.

Reporting Officer
Dated:

Evaluating Officer
Dated:

FORMAT-VI

PERFORMANCE EVALUATION - WATER USERS' PARTICIPATION (WUP) / PARTICIPATORY IRRIGATION MANAGEMENT (PIM)

1. Name of the Project

2. Number of Water Users' Associations / Committees with their names & Status (registered)/ unregistered, elected / selected)

3. The conveyance system with the Irrigation of each association / committee

4. Structure of the Associations / Committees

5. Whether any built-in mechanism exists to see that the farmers' organisations become viable and sustainable and further to ensure that they do not become centres of vested interest?

6. Whether the farmers' associations have freedom for administering the project area within their jurisdiction

7. Is Warabhandi System of water distribution among farmers applicable ? If so, is it functioning properly?

   What are the difficulties being experienced by farmers, in general? What are their suggestions to improve the situation?

8. From where do the farmers arrange their seeds, fertilisers and other inputs ?
   Are they able to get seeds of their choice?
   Are they able to arrange adequate and timely supply of fertilisers and other inputs ?

9. What facilities do the farmers have for plant protection?
   Are they adequate?

10. What are the facilities for storage, transport and marketing of the produce ?
    Are these adequate ?

11. Sources of their Finance - Whether any incentives/ subsidies are given by the Govt. such as management subsidy, maintenance subsidy and incentives for higher recoveries of water charge.

12. Whether the O&M for the project or part thereof has been taken over by them ?

13. Whether any training is being imparted by the project authorities through WALMIs/ IMTIs to the farmers on the optimal use of water and land trough appropriate cropping, irrigation scheduling & water application methods (State the number of farmers trained in the past 4-5 years)

14. Whether Govt. has made any legislation which provides for guidance & directions by way of administrative instructions for meeting the goals of social justice ?

15. Do the project authorities have special mechanism for monitoring and evaluating the functions of farmers' organisations ?

16. Is the policy of water allocation & water users' planing decided by the project authorities in consultation with the farmers' organisations ?

17. Role of associations / committees in resolving the conflicts and the manner in which these are resolved

18. Any other information

Reporting Officer
Date :

Evaluating Officer
Date :

FORMAT- VII

PERFORMANE EVALUATION: IRRIGATION/ AGRICULTURAL PRACTICES AND SURFACE/ GROUND WATER USE

1. Name of Irrigation Projects:
2. Culturable Command Area:
   a) Already developed
   b) Yet to be developed
3. Planned irrigation potential
4. Gross Irrigated Area
5. Net Irrigated Area
6. Potential utilised (year-wise figures)
7. Irrigation intensity (year-wise figures)
8. Method of irrigation (area irrigated source-wise and season-wise for various years)
9. Project performance(efficiency)
10. Designed cropping pattern (crop-wise/ season-wise)
11. Present cropping pattern (year-wise figures)
12. Cropping intensity (year-wise figures)
13. Delta for different crops
14.
    a) Inflow to the command(measured, total)
    b) Losses
    c) Evaporation (from meteorological station in the command or nearby)
    d) Outflows
    e) Water use efficiency
15. Ground Water
    a) Number of wells
    b) Water table (year-wise figures)
    c) Availability and adequacy of electricity

d) Cost of irrigation per ha including installation, O & M costs.

e) Conjunctive use with surface water.

f) Seasonal variation in water table

g) Withdrawals and recharge

16. Any incentives / subsidies being offered by Government

Any other relevant information

Reporting Officer
Date:

Evaluating Officer
Date:

FORMAT-VIII

FARMER RESPONSE: (QUESTIONNAIRE)

1. Name of the Project :

1.1 Distributary No. (Name) _____

1.2 Reach (Head = 1, Middle = 2, Tail = 3)

1.3 (a) Village _____ (b) Farmer's Name _____

Father's Name _____

Field No. _____

1.4 Questionnaire Serial Number _____

2.0 IRRIGATION MANAGEMENT

2.1 When did you hear that the outlet would open? _____

2.2 From whom did you learn of the opening date ? _____
(Newspaper = 1, Radio = 2, Laskar = 3, Neighbour = 4, Other = 5)

2.3 When did the outlet open? _____

2.4 When did the water first reach your outlet ? _____

2.5 Do you obtain water from a well, tank or other source to supplement canal supplies ?
_____ (Well = 1, Tank = 2, Other = 3)

2.6 What area of land do you
a) cultivate? _____ha
b) irrigate? _____ha
c) own? _____ha

2.7 How much of your irrigated land is in the Scheme ? _____ha

2.8 Are you getting water at the pre-decided time?
Yes _____ No _____

2.9 If not, what is your need of irrigation water and are you aware of the critical periods for the crops grown by you?

_____

_____

2.10 Do you think that equitable distribution of irrigated supplies is done among all types of farmers ?

Yes _____ No _____

3.0 CROP CALENDAR

The following questions apply only to the farmers irrigating land within the scheme.

3.1 What are the crops you grew this season?

3.2 For each crop you grew this season when did you :

a) complete the operation ? b) like to have completed it ?

CROP		MTH	WK	MTH	WK
Paddy	Nursery Estab.				
	Land Preparation				
	Transplanting				
	Harvesting				
Groundnut	Planting				
	Harvesting				
Blackgram	Planting				
	Harvesting				
Cotton	Planting				
	Harvesting				
----------	Planting				
	Harvesting				
----------	Planting				
	Harvesting				

3.3 Did any of your crops suffer moisture stress this season ? If so, which crops?

_____ _____ _____ _____

4.0 INPUTS AND PRODUCTION

The following questions apply only to the farmers having irrigated land falling within the scheme.

4.1 Please tell me about each crop you grew this season, variety, area planted, type and amount of fertiliser and amount of production.

Crop	Variety	Fertiliser (Type & kg)	Area Ha	Production kg

_____

_____

_____

_____

_____

_____

_____

5.0 GENERAL

5.1 Would you say that the Irrigation Project has benefited the farmers in the project area?

Yes _____ No _____

If Yes, by way of increasing crop production _____
by way of increasing income of the farmers _____

5.2 Do you find any constraints in the irrigation system?

a. Increased the salinity of soil _____

b. Poor drainage decreased the crop production _____

c. Irrigation water does not reach uniformity to the fields as channels are defective _____

d. Land development work has not been done _____

e. Inadequate land holding for viable production _____

f. Absence of marketing facilities _____

g. Absence / inadequate formation of farmers groups _____

h. Insufficient extension services _____

i. Poor co-ordination between relevant agencies _____

j. All lands are not suitable for irrigation _____

k. Reliability of water supply _____

l. At the main canal level, control structures require more efficient operation _____

m. Low prices of agricultural produce _____

n. High prices of agricultural inputs

e.g. fertilisers, seeds, pesticides _____

o. Inadequate agricultural credit from Banks _____

p. Waste or misuse of water _____

q. Assessment of irrigation is high _____

r. Attitude of Irrigation Officers towards farmers is not helpful _____

s. Incidence of water-borne disease is high _____

t. Percentage of farmers owning pucca house _____

u. Percentage of farmers owning TVs _____

v. No. of schools in the village _____

5.3 In your opinion, how the present system of irrigation can be improved to achieve optimum agricultural production?

6.0 FARMERS' PARTICIPATION

6.1 Do you have Co-operative Irrigation Society in your village?
Yes _____ No _____

6.2 Irrigation Users Association?
Yes _____ No _____

6.3 Farmers involvement in planning, implementation and operation of Irrigation system?
Yes _____ No _____

FORMAT - IX

RESULTS OF FARMERS' RESPONSE

Number of farmers selected in the sample responding to the questionnaire: (Care should be taken to ensure that the sample households have fair representation of small/ medium and big farmers and those belonging to SC/ST).

	Reach		
	Head	Middle	Tail
Total			
No. of farmers chosen in the sample			
No. of farmers from whom response received			
No. of farmers with an alternative water source such as from:			
a) Well			
b) Tank			
c) Other			

NOTES:

1. This is a check on whether the sample response is as designed. Substantial non-response greatly weakens the precision of the statistics in the survey.
2. This table should be appended to each distributary and for the entire scheme. Where the responses for different distributaries differ significantly, this should be noted and an explanation offered.
3. The table is broken down by reach. This is done in almost all tables, as farmer response may be very different in each reach.

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कच्चिद्राष्ट्रे तटाकानि पूर्णानि च महान्ति च !
भागशो विनिविष्टानि न कृषिर्देवमातृका !!

महाभारते सभापर्वणि पंचमोऽध्यायः श्लोक : ६७

Saint Narada so inquired of King Yudhisthira:

"I hope, your realm has reservoirs large and full of water, located in the different parts of the land, so that agriculture does not depend merely on the caprice of the rain-god."

MAHABHARATA, SABHAPARVA
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