

Chapter V: Monitoring, Operation and Maintenance of projects

5.1 Introduction

Monitoring, operation and maintenance are very crucial for implementation and continuance of the programme. Effective monitoring ensures proper implementation besides aiding course correction. This acquires greater importance in programmes where the focus is on expediting progress of works and ensuring completion within stipulated time lines. AIBP guidelines provide detailed framework for monitoring and evaluation of projects and schemes. Operation and maintenance is crucial for ensuring the benefits from infrastructure and logistics in a sustained manner. It adds efficiency and enhances the effectiveness of the programme. Audit examination however, disclosed a number of deficiencies with regard to monitoring, operation and maintenance of projects as highlighted in the following paragraphs:

5.2 Monitoring of projects/schemes

5.2.1 Monitoring by Central Water Commission (CWC)

As per the 2006 AIBP Guidelines, CWC is required to carry out monitoring visits and submission of Status Reports at least twice a year for the period ending September and March of the year. The release of instalments of CA were to be based on the recommendations of CWC after physical and financial verification of projects/schemes by them. The prescribed frequency of physical and financial verification by CWC was later reduced in the 2013 guidelines, from two to one in case of all MMI projects where funds had been released in the previous year.

5.2.1.1 Shortfall in monitoring by CWC

MMI projects

Although information was sought regarding monitoring by CWC for the period from 2008-09 to 2016-17, CWC provided (September 2017) details only for the period from 2010-11 to 2016-17. Details of monitoring by CWC are given in the Table 5.1.

Table 5.1: Details of monitoring by CWC during 2010-17

Particulars	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
Total Sampled projects to be monitored (No. of visits)	88 (176)	88 (176)	88 (176)	22	21	19	27
Projects not monitored at all	22 (25%)	38 (43%)	26 (29%)	4 (18%)	14 (67%)	6 (31%)	2 (7%)
Projects monitored only once in a year	66 (75%)	50 (57%)	41 (46%)	Not applicable	Not applicable	Not applicable	Not applicable
Projects monitored but report not issued	9 (10.23%)	10 (11.36%)	24 (27.27%)	6 (27.27%)	5 (23.81%)	4 (21.05%)	Nil

(Source: Ministry)

[NB: Excluding three deferred projects viz. Kanupur (Odisha), Rongai valley (Meghalaya) Lakhwar Vyasi (Uttarakhand)]

Audit noticed the following:

- Three MMI projects⁷³ were not monitored even once during any of the years from 2010-11 to 2016-17.
- Year wise, MMI projects ranging from two to 38 were not monitored at all during 2010-11 to 2016-17. MMI projects ranging from 41 to 67 were monitored only once in a year during 2010-11 to 2012-13 instead of twice, as required under the guidelines.
- During 2013-14 to 2016-17, there was shortfall of 26 visits in the case of 22 MMI projects where CA had been released in the previous years.
- In 58 cases, monitoring reports were not issued during the period 2010-11 to 2015-16.

MI schemes

The 2006 Guidelines prescribed periodic monitoring of MI schemes on sample basis by CWC against pre-determined targets fixed by the Ministry. The 2013 Guidelines stipulated that at least five *per cent* of the MI schemes should be monitored by the concerned regional offices of CWC.

Audit could not get the information regarding targets prescribed by the Ministry for monitoring of MI schemes by field offices of CWC to evaluate the adequacy of monitoring of MI schemes by CWC. Audit findings in respect of monitoring of MI schemes by CWC are discussed below:

North Eastern States

- In Arunachal Pradesh, CWC conducted monitoring of only 12 out of 625 MI schemes in the State during 2008-17.
- In Assam, no information regarding monitoring of MI schemes was made available to audit.
- In Mizoram, monitoring was carried out in five selected MI schemes during 2008-09. There was no information on monitoring undertaken thereafter.

Other States

- In Bihar and Himachal Pradesh, CWC conducted monitoring of six out of 14 and two out of 17 selected MI schemes respectively, during the period 2008-17.
- In Jammu & Kashmir, Jharkhand, Madhya Pradesh, Rajasthan and West Bengal, none of the MI schemes selected for audit were monitored by CWC during 2008-17. In Uttarakhand, monitoring of sampled MI schemes was not conducted by CWC after May 2012.

⁷³ Koserteda project (Chhattisgarh), Modernization of Kandi Canal and Modernization of New Pratap Canal (Jammu & Kashmir).

- In Karnataka, information about monitoring of sampled MI schemes by CWC was not available in records.

Shortfall in monitoring by the CWC not only affected the execution of projects with respect to time and cost overruns but also adversely affected the quality of works and utilization of IP as already brought out in Chapter IV of this report.

5.2.1.2 Pending follow-up action

Audit noticed that follow up action on CWC's monitoring reports was incomplete due to land acquisition problems in case of four out of five⁷⁴ MMI projects of four States test checked in audit. These cases are discussed below.

- In the case of Tillari Project in Goa, monitoring report pertaining to the period 2008-13 highlighted that certain works were pending for land acquisition, which had not been resolved till July 2017. Further, the issue of delay in constitution of the agricultural wing of CAD was not addressed leading to non-registration of Water Users Association, since October 2014.
- In the cases of Khowai project and Manu projects of Tripura, CWC had recommended (September 2013) that land acquisition be expedited to complete the branch canals. However, in Khowai project, construction remained below target (as of July 2017) due to non-acquisition of land. It was noted that the project had been declared as complete (March 2015) by the State Government without the completion of the canal. In respect of Manu Project, the work was delayed by more than five years and there was a shortfall in IP creation of 2,439 ha due to land acquisition problems.
- In case of Karapuzha Irrigation Project, Kerala, the works of rectification of seepage pointed out during CWC monitoring in June 2013 was pending up to March 2016 and R&R for some families mentioned in CWC monitoring report for 2016-17 was also pending.

Pending remedial action in cases highlighted in monitoring reports indicates ineffectiveness of monitoring mechanism.

5.3 Management Information System (MIS)

5.3.1 Web-based Management Information System for PMKSY

As per para 18 of Operational Guidelines of *Pradhan Mantri Krishi Sinchayee Yojana* (PMKSY), a web-based Management Information System for PMKSY (PMKSY-MIS) will be developed to collect essential information related to each project. However, from PMKSY-MIS website so developed by the Ministry, it was seen that IP utilization of AIBP projects and district-wise data was not available.

⁷⁴ Tillari (Goa), Karapuzha and Chitturpuzha (Kerala) and Khowai and Manu (Tripura).

Ministry accepted the audit observation and replied (February 2018) that the details of IPU would be added to the PMKSY-AIBP Dashboard.

5.3.2 Discrepancy in data of IP of MMI projects

The Standing Committee of the Fourteenth Lok Sabha (2016-17) recommended reconciliation of data regarding IP and maintaining the data at one place so that a holistic picture of progress with regard to creation and utilization of IP is available against envisaged targets.

We noticed discrepancies between the data on IP targets, IPC and IPU data obtained from State Agencies (April-September 2017) and the data provided by the Ministry (February 2018). The variations in the data are summarized below:

- In 110 projects, there was difference in data of targeted IP between the State and CWC to the tune of 5.30 lakh ha⁷⁵ reflecting higher target of IP in State's data.
- IPC of 110 projects showed difference between State data and CWC data to the tune of 5.55 lakh ha⁷⁶ indicating higher creation of IP as per State's data.
- There was a difference between State and CWC data regarding IPU in 60 projects to the tune of 8.42 lakh ha⁷⁷ indicating higher IPU in State's data.

5.4 Use of Remote Sensing

As per 2006 AIBP guidelines, monitoring through Remote Sensing Technology may be used by the GoI to monitor the progress of works, specifically in respect of the IP created. CWC envisaged satellite based monitoring of AIBP projects to supplement the existing monitoring mechanism by providing authentic and objective data. It sought to digitize the completed components for visualization of the extent and size of projects for comparison of target and achievement of physical progress of work, IPC and IPU.

CWC assigned the work to National Remote Sensing Centre, Hyderabad (NRSC) in phases. In the *first phase* (2007-08 to 2009-10), NRSC completed the study for 50 out of 53 projects for which CWC made the data available to it, highlighting gap of about 25 *per cent* (6.54 lakh ha⁷⁸) between field reported IP and satellite based study carried out by NRSC. In 35 projects, there were deviations of more than 10 *per cent* and more than 100 *per cent* in eight projects. In the *second phase*, NRSC completed assessment of IP of 43 out of 50 MMI projects in April 2013 and reported a gap of 38,202 ha between the field data and data

⁷⁵ In 110 projects: In 61 cases no difference, in 25 cases CWC data is higher by 9.28 lakh ha and in 24 cases States data higher by 14.58 lakh ha.

⁷⁶ In 110 projects: in 34 cases no difference, in 33 cases States data higher by 12.83 lakh ha and in 43 cases CWC data is higher by 7.28 lakh ha.

⁷⁷ In respect of 40 cases, there was no difference, in four cases CWC data was higher by 3.80 lakh ha and in 16 cases State's data was higher by 1.32 lakh ha.

⁷⁸ Out of 32.72 lakh ha, IP reported as created by field in 50 projects, the satellite based study through NRSC found that only 26.18 lakh ha had been actually created.

generated by NRSC through satellite in case of 38 MMI projects. In *third phase* only three out of 13 identified projects were monitored through in-house web enabled online monitoring system of CWC.

Ministry contested (February 2018) the assessment of IP done by NRSC based on break in hydraulic connectivity and proportionately reducing the IP creation. Ministry also stated that remote sensing has limitations in digitizing and assessing the minors and sub-minors using imageries. However, the Ministry did not confirm whether any methodology had been prescribed for calculation of IP.

Thus, the use of remote sensing technology was not developed as per the envisaged objectives and the calculation of IP were not based on any uniform and standardized methodology leading to gaps in the data of IP reported by different agencies. Lack of reconciled and complete data on IP at one place hampered in obtaining a holistic picture of IP under AIBP.

5.5 Monitoring at State level

5.5.1 MMI projects

According to 2013 Guidelines, State Level Monitoring Committees (SLMC) were to be activated immediately for the MMI projects under AIBP for implementation of environmental safeguards. Besides, concurrent evaluation of the project by State government was mandatory at the end of each Financial Year, during the period of funding.

In the case of 13 out of 19 States, information regarding formation of SLMC was available. It was noticed that SLMC was formed only in four States⁷⁹.

Out of 115 MMI projects of 19 States, information regarding concurrent evaluation was made available by 17 States⁸⁰ for 86 ongoing MMI projects only. Out of these 86 MMI projects, concurrent evaluation of 43 projects was conducted during 2013-17.

5.5.2 MI schemes

As per 2006 Guidelines, monitoring of the MI schemes had to be done by the State government themselves through agencies independent of construction agencies. Audit findings on monitoring of MI schemes are discussed below:

North Eastern States

- Monitoring by independent agency was done only in Nagaland.
- In Arunachal Pradesh, Assam, Meghalaya, Sikkim and Tripura, monitoring of selected MI schemes by the State Government through independent agency was not done.

⁷⁹ Chhattisgarh, Goa, Gujarat and Odisha

⁸⁰ Assam, Andhra Pradesh, Bihar, Chhattisgarh, Jammu & Kashmir, Jharkhand, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Odisha, Rajasthan, Telangana, Tripura and West Bengal

- In Mizoram, no records in support of monitoring and evaluation of selected MI schemes through independent agency were furnished to audit.

Other States

- In Jammu & Kashmir, Jharkhand, Himachal Pradesh, Rajasthan and Uttarakhand, except for two MI schemes in Jharkhand and Uttarakhand (one each), the concerned State Governments had not conducted evaluation of the selected MI schemes through independent agencies.
- In Andhra Pradesh, Chhattisgarh, Karnataka, Madhya Pradesh, Maharashtra, Odisha, Telangana and West Bengal, records relating to monitoring of MI schemes by State level agencies were not available.

5.5.3 Use of Satellite imageries in Quarterly reports

As per 2013 AIBP guidelines, paper print of Satellite imagery clearly indicating the project components should reach the Chief Engineer (PMO), CWC and to the concerned regional CWC Chief Engineer's office from the concerned States at the end of each year and on completion of the project. For monitoring of the distribution network related works, a list of all the major structures, outlets to be covered in the year concerned and rail/road crossings/utility crossings should be defined as targets and monitored for their achievement.

Audit found that paper print of satellite imagery clearly indicating the project components at the end of each year for all MMI projects under AIBP were not furnished by the State governments to Chief Engineer (PMO), CWC with the physical and financial progress reports.

Ministry accepted (February 2018) that States had not been able to furnish these imageries because of lack of availability of technical expertise, inability to procure the good quality imageries, etc.

5.6 Operation and maintenance of projects/schemes

5.6.1 Water Users' Association

Public Accounts Committee (68th Report on AIBP during 15th Lok Sabha) recommended to the Ministry to oversee and ensure that all the State Governments enact laws on participatory irrigation management and constitution of Water Users' Associations (WUAs) for the effective implementation of the AIBP projects. As per AIBP Guidelines, Water User Associations were to be formed for post construction maintenance of assets created under the MI schemes.

Information regarding enactment of laws on participatory irrigation management was available for 21 States of which 13 States had enacted laws on participatory irrigation management.

Information regarding formation of Water User Associations (WUAs) was provided by 20 States of which 12 States had formed WUAs but were not formed for all the projects/schemes.

The objective of ensuring participatory irrigation management was not adequately met which affected monitoring and collection of water usage charges, control over distribution of water and theft and diversion of water.

CASE STUDY OF ILLEGAL LIFTING OF IRRIGATION WATER FROM CANALS

In the Narmada Canal Project, compulsory pressure irrigation was adopted by using sprinklers or drip. It was observed that the Narmada Main Canal and its distributaries and minors suffered due to water theft by nearby cultivators who illegally lifted water from canals to irrigate their fields by using motor pumps. As such, a campaign was launched (28 April 2016 to 30 April 2016) to remove illegal motor pumps and other encroachments from Narmada Main Canal and a number of motor pumps/engines and pipes were seized. It was observed that no such campaign was undertaken for checking drawal of water from distributaries and minors, although these were also facing the problem of water theft.



Distributary of Narmada Canal

CASE STUDY OF LIS AT BAMBARDE, TARALE, PAL AND INDOLI

The project authorities incurred expenditure of ₹ 28.32 crore and ₹ 42.38 crore on construction of LIS at Bambarde & Tarale and at Pal & Indoli respectively. Though the work was completed in May 2013, the said LISs were not utilized as the WUAs were not formed. The work of formation of WUA was undertaken in September 2014 at a cost of ₹ 40.64 lakh with a time limit of 30 months i.e. by March 2017, however the same was incomplete and payment of only ₹ 4.75 lakh was made. As a result, the expenditure amounting to ₹ 70.70 crore incurred on the construction of LIS remained blocked. Further, due to non-functioning of LIS, the projected IP could not be utilised despite availability of water.

5.6.2 Deficiencies in Operation and Maintenance of projects/schemes

Timely and proper maintenance of project assets created under AIBP is necessary to ensure uninterrupted functioning of the facilities created and continued accrual of benefits to farmers. In the absence of an established mechanism for operation and maintenance of the infrastructure created and of participatory irrigation management as mentioned in para 5.6.1 above, audit found several cases of poor maintenance resulting in damage to structures and non-utilisation of IP, which are discussed in Table 5.3 below:

Table 5.3: Shortcomings/ Deficiencies in O&M

State	Issues in O&M
Andhra Pradesh	In case of Veligallu Project completed in August 2007, Audit observed that proper maintenance was not taken up by the concerned Department as certain defects in the original work stated to be completed by the contractor were not rectified.
Goa	In case of Tillari project, due to non-execution of maintenance work in certain section of the canals, there was significant growth of vegetation.
Jharkhand	In Sonua Reservoir scheme, audit noticed civil structures like concrete slab of spillway, Aqueduct-cum-bridge of Left Main Canal and Cross Drainage at 12 Km of Left Main Canal were damaged and obstructing the flow of water despite incurring expenditure of ₹ 7.18 crore till 31 March 2017 for maintenance of the assets.
Karnataka	Under Gandorinala project, audit noticed poor maintenance of canal network in the completed portion, affecting the flow of water.
Kerala	In Karapuzha project, there was decline in IP utilization during 2011-12 to 2015-16 from 938 ha to 530 ha due to seepage at many places and curtailment in water distribution. Due to delay in repair work of the canal, IP created could not be utilized for five years.
Madhya Pradesh	Although an amount of ₹ 12.88 lakh was spent towards repair of the damaged portion of the Berkhedi Weir scheme for restoration of lost IP, a portion was washed away with flow of water and the weir could not be maintained. Audit also noticed damages in canal and blocks in sluice outlet in Rehmanpura Tank and Bekhalda Tank MI schemes reflecting inadequate maintenance work by the department.
Maharashtra	In case of five projects, audit noticed blockage of water due to growth of heavy vegetation in the canal. In two projects, flow of water was obstructed due to debris. In two projects, the farmers had encroached on the service road and inspection paths of the canal and were carrying out agricultural activities on the encroached land.
Tripura	In Manu and Khowai projects, audit noticed that many stretches of canal network required repair and maintenance for clearing obstruction caused due to felling of trees, landslides and growth of bushes.
West Bengal	During site visit of Tatko Irrigation project in May 2017, pier and abutments of spillway under the Head works portion completed before inclusion under AIBP (2000-01), were in bad condition. The project authority stated (June 2017) that maintenance work has been initiated.

5.7 Audit summation

There were shortfalls in number of monitoring visits by CWC and evaluation of projects at the State level. State Level Monitoring Committees were formed in four States only. CWC reports were not prepared in all projects visited by officials and issues highlighted in the CWC reports were also pending for compliance. Monitoring through Remote Sensing Technology by NRSC was very limited due to the low resolution of imageries and other limitations attributed by the Ministry. However, gaps in IP highlighted by NRSC and variance in IP data of the NRSC and the Ministry was indicative of systemic limitations in calculation of IP. Participatory irrigation management through Water Users Associations suffered from serious limitations due to limited number, status and the resources at their command affecting the O&M of projects. Besides, lack of timely follow-up action to address deficiencies and deviations and shortfall in monitoring affected evaluation of the programme.

Conclusion

Lack of adequate and assured supply of water has been the bane of Indian Agriculture adversely affecting the agricultural output and growth. AIBP was conceived as a programme to expedite a large number of irrigation projects taken up at considerable cost so that the objective of providing adequate and assured water supply for farming was met and agriculture received the required impetus. The programme was taken up in 1996-97 and gradually expanded to cover all types of irrigation schemes and projects. The funding pattern under the Programme also continued to evolve with focus on Special Category and Hilly States and on Special Areas. The programme has now been subsumed in the *Pradhan Mantri Krishi Sinchayee Yojana* and is focussing on 99 incomplete MMI projects to be completed in Mission Mode. During the period covered by this Performance Audit i.e. 2008-17, 201 MMI projects and 11,291 MI schemes were being implemented under AIBP and the total Central Assistance (CA) released to these projects /schemes was ₹ 41,143 crore. Despite the importance of the Programme, its continued existence since 1996-97 and substantial Central outlays on the projects, audit of the AIBP revealed several deficiencies in the planning, implementation and monitoring of the programme.

Projects and schemes were found to have been included under AIBP in deviation of guidelines and deficiencies in preparation and processing of Detailed Project Reports and incorrect calculation of Benefit Cost Ratio of the projects were observed. These led to modifications in design and scope of work and revision in cost estimates affecting the schedule of implementation of the projects. Shortfalls were also found in the way the finances for the programme was managed with funds not being fully released or being released with delays. Utilisation Certificates for funds amounting to ₹ 2,187.40 crore, constituting 37 *per cent* of the total CA received by the State agencies were not submitted to the Ministry in time. Financial irregularities such as diversion and parking of funds and fictitious and fraudulent expenditure were observed.

Implementation of projects under AIBP was slow with percentage of projects getting completed being low and projects facing delays ranging from one to 18 years. The delays in implementation of projects together with deficient planning and inefficient works management led to substantial cost overrun in most of the projects. The realization of envisaged benefits in terms of Irrigation Potential (IP) creation was only 68 *per cent* in MMI projects and 39 *per cent* in MI schemes. The utilization of IP created was 65 *per cent* and 73 *per cent* respectively for MMI projects and MI schemes. The delays and cost overruns were due to factors such as delays in land acquisition, delayed Rehabilitation and Resettlement (R&R) measures and clearances and deficiencies in works management. Several instances of irregular/wasteful/avoidable/extra expenditure and undue favour to contractors were also observed.

Audit also disclosed that monitoring by Central and State agencies was lax and modern technology such as Remote Sensing Technology was not effectively deployed. In addition, participatory irrigation management through Water Users Associations suffered from serious limitations due to their less number, status and the resources at their command affecting the Operation and Maintenance of projects.

Thus, even though AIBP was of critical importance for the growth of the agricultural and farming sector and substantial Central outlays had been made on projects covered by it, the Programme continues to lag and faced ballooning costs. Moreover, most of the projects have not achieved their target IP. Cost escalation due to various factors outlined in the Report and lower benefits than envisaged on account of shortfall in IP creation and utilisation resulted in actual Benefit Cost Ratio (BCR) being lesser than the original calculated BCR of projects. Thus, delays in completion of projects, escalation in their costs and shortfall in IP creation and utilisation undermined the overall objective of the Programme which was to ensure expeditious completion of irrigation projects so that adequate and assured water supply was made available for farming.

Recommendations

Based on the audit findings the following recommendations are made:

1. Due diligence must be exercised while computing Benefit Cost Ratio of projects which should be based on realistic assumptions and should be reviewed continuously.
2. The Ministry may evaluate performance of the programme and of individual projects to identify specific areas for focussed attention and also intensify efforts for expeditious completion of the programme.
3. To improve IPU, *pari passu* implementation of Command Area Development Work in the projects should be ensured and concerned States should be advised to submit Command Area Development proposals at the earliest.
4. State Government should be advised to ensure adequate checks in management of works under the programme and fix accountability for deficient execution of works.
5. The Ministry may ensure regular monitoring and evaluation at the Central level as well as by various agencies and take up timely follow up action.
6. The Ministry may develop a uniform and reliable system for calculation of Irrigation Potential created and reconcile the same with data obtained through Remote Sensing Technology so as to obtain an accurate assessment of the performance of the projects/schemes.

New Delhi
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