

CHAPTER – II

PLANNING AND EXECUTION OF IRRIGATION PROJECTS

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Irrigation projects are essentially long-term projects involving huge investment of financial resources. The planning of the projects depends on various factors including the intended outcomes, stakeholders involved, the geographical location of the project *etc.*

While enhancement of IP was the common objective for all irrigation projects, other sub-objectives like supply of drinking water and pisciculture were also included in the plans. Planning process of an irrigation project generally involves a proposal from the Water Resources Department (WRD), preparation of Detailed Project Report (DPR), techno-economic feasibility study for viability of the project by Central Design Organisation¹, Nashik, clearance of project for inter-state aspects and availability of water for the project by Central Water Commission (CWC) and administrative approval by the State Government.

Successful execution of an irrigation project and effective delivery of outcomes require detailed planning at each stage of the project. For efficient and effective utilization of water, an integrated and comprehensive plan is of vital importance. This would ensure balanced development to meet the diverse needs of the water users.

2.1 Planning

DPR is prepared taking into account data from surveys, geological investigation, seismic investigation, hydrology, design requirements *etc.* and is approved by the State Government. Audit noticed several deficiencies in planning of the projects which led to time and cost over-run as discussed in the succeeding paragraphs.

2.1.1 Availability of water

The CWC guidelines 1989 provide for clearance of the medium irrigation projects with regard to water availability and inter-state aspects after the techno-economic feasibility is certified by the Central Design Organization, Nashik. Even after assessment of water requirement for the projects, availability of water is essential, because viability of the project depends solely on the availability of water at source.

¹ It is a design institution of Water Resources Department, Government of Maharashtra engaged in carrying out design of major, medium and minor irrigation projects in Maharashtra.

The department assessed the availability of water at the time of preparation of DPRs based on rainfall data from nearest river/rain gauging stations, and crop water requirement. It was observed that in none of the six projects, the required CWC clearance regarding water availability and inter-state aspects was obtained by the WRD. The availability of water for irrigation in the selected projects is detailed in the **Table 2.1.1**:

Table 2.1.1: Quantity of water proposed for storage in dam and lifting in Lift Irrigation Scheme *vis-a-vis* actually available (2014-15 to 2020-21)

Sr. No.	Name of the Project	Quantity of water proposed for storage / lifting annually (Mm ³) ²	Quantity of water actually available (Mm ³)	Percentage of water actually available
1.	Andhali	9.27	2.64 to 7.43 (No water was available during 2016-17 and 2018-19)	28 to 80
2.	Pimpalgaon (Dhale)	12.66	(-) 9.86 ³ to 12.01 (No water available during 2017-18 and 2018-19)	5 to 95
3.	Purna	41.75	20.62 to 35.35 ⁴	49 to 85
4.	Haranghat LIS	41.57	0 to 13.88 (No water lifted in 2020-21)	4 to 33
5.	Sondyatola LIS	65.30	16.11 to 42.34	25 to 65
6.	Wagholibuti LIS	24.42	0 to 15.83 (No water lifted in 2020-21)	10 to 65

Source: Information furnished by the respective divisions.
Note- Data of LIS is quantity of water actually lifted.

Above table indicates that availability of water for storage in the dams of the medium projects and for lifting in the LIS projects was not adequate⁵. In case of Pimpalgaon (Dhale) project, the water storage in the dam was below the dead storage level during 2017-18 and 2018-19. In case of the Sondyatola project, the project was constructed on the Bawanthadi river, on the upstream of which an inter-state major project⁶ was already constructed. Thus, failure to obtain the mandatory CWC clearance for all the projects resulted in inaccurate assessment of water availability. Consequently, the water required to irrigate the command area was not available in any of the projects. The non-realisation of annual benefits as a result of non-availability of water has been brought out in **paragraph 2.2.5**.

² Mm³ - Million metre cube.

³ (-) figure indicate quantity below dead storage.

⁴ Pertains for the year 2015-2016 to 2019-2020. Information for the year 2014-15 awaited.

⁵ Ranged between four *per cent* to 95 *per cent*.

⁶ An inter-state project in the states of Maharashtra and Madhya Pradesh.

Government stated (November 2021) that in case of Sondyatola LIS, CWC clearance was not obtained because in a meeting it was decided (24.10.2005) that the projects with Administrative Approvals (AAs) prior to December 2003 did not require CWC clearance. In Purna project, the process of obtaining CWC clearance was not completed due to insufficient information on monitoring of ground water levels in pre and post irrigation conditions and conjunctive use of ground and surface water. In case of Pimpalgaon(Dhale), Haranghat LIS, Wagholibuti LIS and Andhali, the CWC clearance was not necessary, as these projects were not inter-state projects.

The reply is not acceptable as all six projects were classified as medium irrigation projects and as per CWC guidelines, it was mandatory for medium irrigation projects to obtain clearance from CWC.

Recommendation 1: The Government may ensure prior clearance of the projects from the Central Water Commission.

Recommendation 2: The Government may improve project management to avoid deprivation of water in drought prone areas of the state, regulate the lift irrigation and ensure optimal distribution of water.

2.1.2 Time overrun of projects

Timely completion is crucial for success of any project. This is more so for projects directly affecting food production and development of an area. Delays can, not only deprive the beneficiaries of the intended benefits but also result in increased cost in addition to further complexities as project parameters can change with passage of time.

None of the selected projects were completed within the stipulated time and multiple revisions in administrative approvals kept the projects in construction phase. Out of selected six projects, four⁷ projects were completed with delays ranging from 11 years to 25 years and two⁸ projects are yet to be completed even after the lapse of more than 20 years. The time overrun in respect of selected projects is depicted in **Chart 2.1.2 and Table 2.1.2**.

⁷ Andhali, Haranghat, Sondyatola and Wagholibuti.

⁸ Pimpalgaon (Dhale) and Purna.

Chart 2.1.2: Time overrun of projects

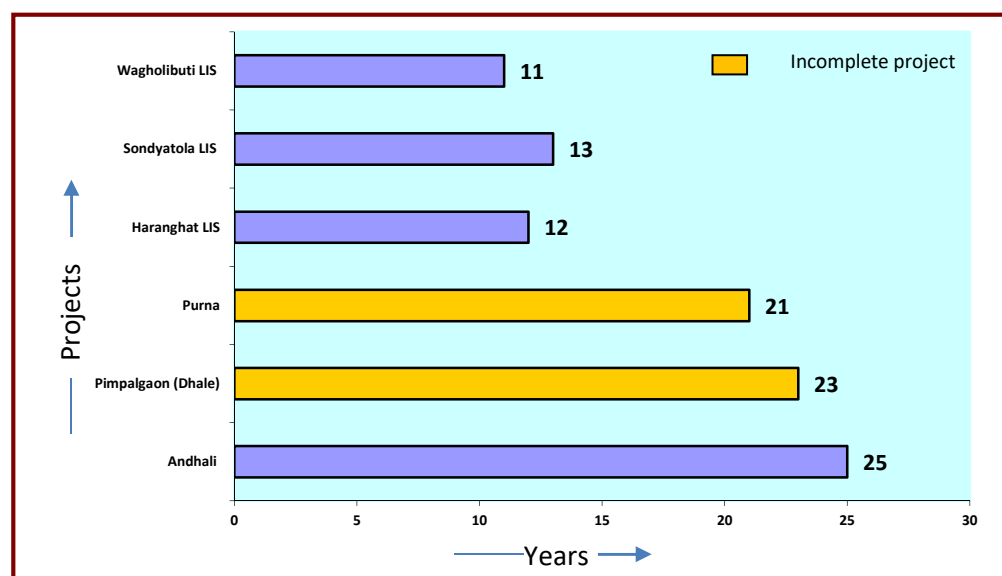


Table 2.1.2: Statement showing the detail of time overrun in projects as on 31 March 2021

Sr. No.	Name of the Project	Commencement year	Stipulated period of completion	Completion year	Delay in years	Reasons for delay
1.	Andhali	November 1986	November 1989	2014	25	Land acquisition and unavailability of funds
2.	Pimpalgaon (Dhale)	1996	January 1999	Incomplete	-	Land acquisition and incomplete distribution network.
3.	Purna	January 1995	January 2001	Incomplete	-	Change in scope of project, incomplete work of pipeline distribution network.
4.	Haranghat	March 1999	February 2002	2014	12	Changes in design and scope of the works and land acquisition.
5.	Sondyatola	November 1995	1999	2012	13	Change in design and land acquisition.
6.	Wagholibuti	1993-94	November 1995	2006	11	Paucity of funds, change in design and land acquisition.

Source: Information furnished by the respective divisions

Change in scope of work, delay in land acquisition and incomplete distribution network are the main reasons for delay in completion of the projects. This indicates that planning related to these issues was ineffective.

2.1.3 Cost overrun of projects

For any major project involving public money, keeping the expenditure within the budgeted amount is one of the major challenges before the project management. In a complex irrigation project, inadequacies in planning or in

efficiencies in execution can lead to manifold increase in costs which in turn, affects the completion of the project. The details of project cost in the selected projects are given in **Table 2.1.3**.

Table 2.1.3: Statement showing the detail of cost overrun in projects

Sr. No.	Name of the Project	Month/ year of original AA	Original estimated cost (₹ in crore)	Latest Revised cost (₹ in crore)	Cost increase (in percentage)
1.	Andhali	April 1977	1.15	17.97	1463
2.	Pimpalgaon (Dhale)	June 1994	10.01	95.39	853
3.	Purna	July 1994	36.45	259.34	611
4.	Haranghat	February 1996	12.19	49.21	304
5.	Sondyatola	May 1995	13.33	124.93	837
6.	Wagholibuti	November 1993	9.50	53.22	460

Source: Information furnished by the respective divisions

As seen from the table, all the projects had significant cost overrun ranging from 304 *per cent* in the case of Haranghat project to 1463 *per cent* in the case of Andhali project.

The analysis of project wise time and cost increase is detailed in the succeeding paragraphs.

Andhali - The project was to be completed in November 1989 at a cost of ₹ 1.15 crore but was completed in December 2014, after a delay of 25 years incurring an expenditure of ₹ 17.92 crore.

It was observed that the time and cost increase was due to increase in cost of investigation, change in design of dam requiring additional land, new *gaathan*⁹ and tail channel, increase in provision for distributaries, payment of compensation to the rehabilitated villagers of Bodke and Andhali, providing basic amenities to the rehabilitated villages and change in District Schedule of Rates.

Pimpalgaon (Dhale) - The project was approved originally in June 1994 at a cost of ₹ 10.01 crore. Even after 25 years of initiation of project and incurring an expenditure of ₹ 111.46 crore, the project was incomplete (November 2021).

It was observed that except for the dam construction, the works of construction of 4.25 km out of 23 km of right bank canal and 11 out of total 12 distributaries were still incomplete as the required land was not made available.

⁹ Government land near the village

Purna - The project was to be completed in January 2001 at a cost of ₹ 36.45 crore. Even after a delay of more than 20 years, the project was incomplete despite incurring an expenditure of ₹ 291.73 crore.

It was observed that the increase in project cost and delay was mainly due to change in design, increase in length of the dam, gates and canal, increase in cost of land acquisition, provision of construction of Pipe Line Distribution Network (PDN) field channels, tail channels *etc.* The PDN work was still incomplete and a proposal for fourth revision of the AA for ₹ 368.63 crore submitted (February 2019), was still pending with the GoM for approval. Thus, 26 years after the initiation of project, only 75 *per cent* of the projected IP was created and its utilization ranged from 15.48 *per cent* to 43 *per cent* during 2014-15 to 2020-21.

Haranghat - The project was to be completed in February 2002 at a cost of ₹ 12.19 crore but the project was completed in June 2014 after a delay of 12 years and incurring an expenditure of ₹ 49.95 crore.

It was observed that the time and cost increase was mainly due to change in Schedule of Rates, increase in cost of land, changes in design and scope of the works. As a result, the farmers under the command area of the project were deprived of the intended benefits for 15 years and after spending four times of the original project cost. Further, only 46.27 *per cent* to 51.29 *per cent* of the IP created was utilized.

Sondyatola - The project was to be completed in May 1999 at a cost of ₹ 13.33 crore. However, it was completed in March 2012 after a delay of 13 years after incurring expenditure of ₹ 120.87 crore.

It was observed that the time and cost increase was mainly due to change in design, increase in cost of land acquisition and incorporation of new provisions. However, even after the delayed completion and after spending nine times of the original project cost, only 67.40 *per cent* to 85.94 *per cent* of the IP created was being utilized. Besides, the farmers did not get the intended benefits from the project due to non-availability of water at source during rabi and hot weather seasons¹⁰.

Wagholibuti - The project was to be completed in November 1995 at a cost of ₹ 9.50 crore, but it was completed in June 2006¹¹ after a delay of 11 years and incurring expenditure of ₹ 49.45 crore.

¹⁰ rabi season is from 15 October to 28 February and hot weather season from 01 March to 30 June.

¹¹ the project was handed over in June 2017.

The time and cost increase was mainly due to change in design, increase in cost of land acquisition and incorporation of new provisions. Even after the delayed completion of the project, only 47.51 per cent to 77.06 per cent of the IP created was utilized and the farmers were deprived of the intended benefits from the project due to non-availability of water at source during rabi and hot weather seasons.

Government accepted (November 2021) the delay in completion of all the six projects.

Recommendation 3: The projects may be planned and executed in such a manner that they are completed in time and within the estimated cost and projects delayed with cost overruns should be completed at the earliest.

2.2 Execution

2.2.1 Revised approval to the projects despite unviable BCR

The CWC guidelines (2010) specify that expenditure on a project is considered as economically viable if the annual benefits exceed the annual costs (including interest) on the capital expenditure. It also prescribes that the minimum BCR for approval of medium irrigation projects is 1.5 except in drought prone areas, where it is one.

The BCR of the six projects is given in **Table 2.2.1**.

Table 2.2.1: Statement of BCR

Sr. No.	Name of the project	Original BCR	First revised BCR /Date of AA	Second revised BCR /Date of AA	Third revised BCR /Date of AA
1	Andhali*	2.02 (26.04.1977)	1.49 (09.02.2004)	--	--
2	Pimpalgaon (Dhale)*	1.08 (30.06.1994)	1.08 (02.09.1999)	1.03 (03.02.2004)	1.18 (18.03.2010)
3	Purna	2.05 (08.07.1994)	1.93 (13.06.2000)	1.62 (28.10.2005)	0.96 (28.03.2016)
4	Haranghat	2.07 (08.02.1996)	1.74 (07.01.2002)	--	--
5	Sondyatola	1.96 (08.05.1995)	1.77 (21.12.2001)	1.61 (14.08.2009)	1.72 (02.04.2016)
6	Wagholibuti	1.86 (10.11.1993)	1.80 (24.02.2000)	2.36 (04.01.2012)	1.23 (05.03.2018)
(*) Project under drought prone area					
Source: Information furnished by the respective divisions					

In Purna project, at the time of third revised AA (28.03.2016) though the BCR was 0.96, the project was approved. BCR of the Purna project came down from 2.05 (original AA in July 1994) to 0.96 (third RAA in March 2016). The delay in execution escalated cost of this project from ₹ 36.45 crore (original cost) to ₹ 259.34 crore (third RAA) as detailed in **paragraph 2.1.3**. In case of

Haranghat LIS project, it was observed that during preparation of DPR, the BCR was determined on the basis of the cropping pattern of a nearby major project¹² instead of obtaining specific inputs from the Agriculture department. This cropping pattern considered cash crops (like sugarcane) and horticulture crops (like orange, green manuring crops *etc.*) for cultivation. Similarly, in Wagholibuti project, it was revised to 1.23 (05.03.2018) which was below the prescribed limit.

State Government stated (November 2021) that in Purna project, fourth revision to administrative approval (AA) was given on 06.08.2021 where the BCR was revised at 1.52 and hence the project was viable. In Haranghat, efforts to motivate the cultivators to take crops in second season were being made. In case of Wagholibuti, reduction in the BCR was attributed to extra expenditure on some items which required third revision to the AA.

The reply in case of Purna project is not acceptable as the BCR during the period 28.03.2016 to 06.08.2021 was below 1.5 making the project unviable. In Haranghat project, there was no historical evidence of cultivating the crops suggested as per the cropping pattern in the command area of the project. In Wagholibuti project, approval was given despite project being unviable at the time of third RAA (05.03.2018).

2.2.2 Target for creation, actual creation and utilization of Irrigation Potential

Targets were set in each project for creation of IP and its utilization. Achievement of these targets was crucial for meeting the overall objectives of the projects. The position of targets fixed for IP creation, actual IP created and IP finally utilized by the cultivators in respect of the six selected projects for the period from 2014-15 to 2020-21 is as under:

Table 2.2.2: IP - Targeted creation, actual creation and utilization

Sr. No.	Name of the Project	Target of creation (ha)	Actual Creation (ha)	Gap in creation		Utilisation (ha)	Gap in utilisation against actual creation (ha)	Percentage Utilisation of IP to Actual Creation
				(ha)	(per cent)			
1.	Andhali	2322	1350	972	41.86	0 to 451	899 to 1350	0 to 33.40
2.	Pimpalgaon (Dhale)	3384	1910	1474	43.56	0 to 1302	608 to 1910	0 to 68.17
3.	Purna	10040	7530	2510	25.00	1166 to 3238	4292 to 6364	15.48 to 43.00
4.	Haranghat LIS	5842	4820	1022	17.49	2230 to 2472	2348 to 2590	46.27 to 51.29
5.	Sondyatola LIS	11733	11358	375	3.20	7655.62 to 9761	1597.00 to 3354.38	67.40 to 85.94
6.	Wagholibuti LIS	5505	4542	963	17.49	2158 to 3500	1042 to 2384	47.51 to 77.06

Source: Information furnished by the respective divisions.

¹² Gosikhurd Irrigation project.

It can be seen from the table that the target of creation of the IP could not be achieved in any of the six projects. The gap between the projected creation and actual creation of the IP ranged from 3.20 *per cent* to 43.56 *per cent*. Further, the utilisation of the IP actually created was also unsatisfactory and it ranged from zero *per cent* to 85.94 *per cent* during the period 2014-15 to 2020-21. Further, in Pimpalgaon (Dhale) and Purna projects target of IP creation and its utilization were not achieved. Moreover, both the projects are still incomplete even after the initiation of 25 and 26 years respectively. In addition to this, maintenance of canal system in Andhali and Wagholibuti projects were poor, affecting the discharge of water through the canals, as discussed in **paragraph 3.1.2**. This resulted in under-utilization of IP created.

In Andhali project, as no irrigation was provided through canal in the command area of the project, the farmers were lifting the water from the dam at their own cost and arrangement. In Pimpalgaon (Dhale) project, the water stored in the dam was being lifted by the farmers of the non-command area. However, the divisions of these projects were depicting it as utilization of the created IP, which was incorrect as the water was not being supplied through canal system. Non-utilisation of IP created in Andhali and Pimpalgaon (Dhale) projects resulted in wasteful expenditure of ₹ 17.92 crore and ₹ 111.46 crore incurred on these projects respectively.

State Government stated (November 2021) that in Andhali and Pimpalgaon (Dhale) projects, canal works were hampered due to opposition of farmers and land acquisition problems and irrigation was done by allowing farmers to lift water from the reservoir. In Purna, the targeted IP of 7530 *ha* was actually created and as per fourth revised AA, command area was increased by 1900 *ha*. This additional IP would be created by December 2023. In Haranghat LIS, IP of 5842 *ha* was created as targeted and hence, there was no gap. The farmers were being motivated to take crops in second season to increase the utilization of IP and value of produce. In Sondyatola LIS, irrigation during 2019-20 and 2020-21 in kharif season was 7974 *ha* each year and in hot weather season it was 2374 *ha* and 2609 *ha* respectively. So there was considerable increase in IP, reducing the gap substantially. In Wagholibuti LIS, the targeted IP of 5505 *ha* was achieved fully. However, the farmers were being motivated to take crops in second season so as to increase IP utilization and value of produce.

The reply is not acceptable as in Purna project there was gap in IP created and targeted. In case of Haranghat and Wagholibuti projects, the Government did not furnish documents in support of its reply that the targeted IP was created. In case of Sondyatola project, the data of irrigation provided by the department includes irrigation provided from surface irrigation and other source of irrigation *i.e.* well, river, nallas *etc.* The actual surface irrigation

through canal provided from the project was very less as compared to the IP created and the target for irrigation.

Recommendation 4: IP estimated should be achieved by prioritizing maintenance of canal system/ preventive works.

2.2.3 Irrigation and cultivation in the command area

As per the DPRs of the selected projects, water required in the seasons could be made available from the respective project. Accordingly, irrigation facility for cultivation would be provided. Scrutiny of records revealed that in all the six projects there was considerable shortfall in irrigation of the targeted area of land in the seasons (kharif/rabi/hot weather). Project-wise irrigation provided in different seasons during the period 2014-15 to 2020-21 is detailed in *Appendix II*. Audit observations thereon are as under:

Andhali – This project was designed to irrigate 1723 *ha* of land in kharif and rabi seasons. However, irrigation through canal was not provided during the period 2014-15 to 2020-21 in spite of availability of water in the dam (except 2016-17 and 2018-19) due to incomplete canal work. The farmers were lifting the water from the dam by making their own arrangement.

Pimpalgaon (Dhale) – This project was designed to irrigate 2400 *ha* of land in kharif and rabi seasons in six villages. Irrigation potential of 1910 *ha* only was created against the targeted IP of 3384 *ha* due to opposition of farmers, delay in land acquisition and incomplete distributary network. However, it was observed that no surface irrigation through canal was provided to the beneficiaries in the command area of project upto 2020-21 resulting in non-utilization of created IP. The water stored in the dam was utilized by the farmers not belonging to the command area of the project through private lifting.

Purna – This project was designed to irrigate 6275 *ha* of land in kharif and rabi seasons. However, actual irrigation provided through the project ranged between 1166 *ha* (in 2020-2021) and 3238 *ha* (in 2016-17) only, for the period from 2014-15 to 2020-21 due to incomplete distribution network.

Haranghat – This project was to irrigate 3651 *ha* of land in all three seasons by lifting 41.57 million metre cube (Mm³) water annually from Wainganga river. We observed that the division provided irrigation in kharif season only ranging between 2412 *ha* (in 2019-20) to 2454 *ha* (in 2018-19) for the period from 2014-15 to 2020-21 and failed to provide irrigation in rabi and hot weather seasons.

Sondyatola – This project was to irrigate 9025 *ha* of land in all the three seasons by lifting 65.30 Mm³ of water annually from Bawanthadi river.

Scrutiny of records revealed that the division failed to provide irrigation in rabi and hot weather seasons through the project as planned, despite demand from the farmers.

Wagholibuti – This project was to irrigate 3441 *ha* of land in all the seasons by lifting 24.42 Mm³ of water annually from Wainganga river. Scrutiny of records revealed that the division failed to lift water during rabi and hot weather seasons during 2014-15 to 2020-21. Thus, irrigation in kharif season only was provided and the area under actual cultivation ranged from 2158 *ha* (in 2016-17) to 2703 *ha* (in 2017-18) during 2014-15 to 2020-21.

This indicates that cultivation in command area of these projects was not up to its full potential during all the seasons as provided in their respective DPRs.

Government accepted (November 2021) the audit observations in Andhali, Pimpalgaon (Dhale), Wagholibuti and Haranghat projects. In case of Purna project, it was stated that the irrigation was provided in kharif and rabi seasons as per demand of farmers and out of 6275 *ha* actual irrigation provided was 5417 *ha* which was maximum. In Sondyatola project, irrigation was provided through all the seasons.

Reply is not acceptable as in the case of Sondyatola project the irrigation provided through all the seasons as stated by the department includes irrigation from sources other than surface irrigation also. In the case of Purna project, there was a gap between targeted irrigation and actual irrigation provided through canals.

2.2.4 Cropping Pattern

The cropping pattern in the projects was decided by considering various parameters like water availability, existing cropping pattern, climatic conditions, nature of soil, groundwater conditions, newly introduced modern farming techniques, studies and research. The cropping pattern under the command area of the selected projects as per the DPRs in terms of variety of crops and cultivable area is given in *Appendix III*.

Audit observed that actual cropping pattern under the command area of the selected projects was different from that proposed in the DPR in terms of variety of crops and cultivable area. Further scrutiny of records at Taluka Agriculture Offices (TAOs) under the respective project divisions revealed that cultivation in the villages of command area of the projects in rabi and hot weather seasons was very poor as compared to the cultivation in kharif season as irrigation was not assured by the WRD during these two seasons. Moreover, the cultivation in rabi and hot weather seasons was done by the farmers from their own source as irrigation through canal was not available in rabi and hot weather seasons. The cropping pattern proposed in the DPR and traditional

crops mainly followed in the command area of the project is depicted in **Table 2.2.4.**

Table 2.2.4: Cropping pattern proposed in the DPR and traditional crops mainly followed

Sr. No.	Name of the project	Cropping pattern proposed in the DPR	Traditional cropping mainly followed
1.	Andhali	Two seasons – Chillies, Cotton Kharif– Hy. Bajari, Groundnut, Pulses (UI), Green Manure, Vegetables, Onions, Hy. Jowar, Hy Maize, and Groundnut (UI). Rabi - Wheat, Hy. Maize, Hy. Jowar, Vegetables, Onions, Fodder, Gram and Bajari.	Bajra and Jowar besides other crops in kharif and rabi seasons
2.	Pimpalgaon (Dhale)	Two seasons – Chillies and LS Cotton Kharif– Hy. Jowar, Kharif Bajri, Groundnut, Sunflower, Vegetable, Pulses, Bajri, Kharif Hy. Jowar and Kadwal Follow on Crops - Hy. Wheat, Rabi vegetables, Hy. Jowar, Gram and Sunflower	Soyabean, Tur and Black Gram in rabi season, and Jowar and Wheat in kharif season.
3.	Purna	Two seasons – LS cotton and Chillies Kharif- HY Jowar, Paddy drilled, groundnut and pulses. Follow on crops- Wheat, Gram, oil seeds and vegetables	Hybrid Jowar, Pulses and Soyabean in kharif season and Gram and Wheat in rabi season.
4.	Haranghat	Kharif- HY Paddy, LY Paddy, Groundnut, Kharif vegetables (two seasonal), Chillies, Sugarcane, horticulture crops, Kharif pulses and Green manuring crops Follow on Crops- Wheat after green manuring crops, Rabi HY Jowar, Rabi vegetable, Gram after Paddy, Vatana pulses, summer Paddy and Green fodder.	Paddy and Tur in kharif season and Gram and Lakhodi in rabi season.
5.	Sondyatola	Perennial crops- Sugarcane Kharif- Paddy, Vegetables and pulses Rabi- Wheat, Sunflower, vegetables and Gram	Paddy in kharif season and no crops in rabi season.
6.	Wagholibuti	Perennial crops- Sugarcane and horticulture crops Two seasons- chillies Kharif seasonal- H.Y. Paddy, L.Y. Paddy, Groundnut, Kharif vegetables, Pulses and Green manuring crops Rabi- Wheat after green manuring, Hy. Jawar, Rabi vegetables and Gram after Paddy and Utana pulses (U.T.) Hot weather crops- summer Paddy after Kharif Paddy and Green fodder	Paddy and Jowar in kharif season and no crops in rabi season.

As such, there was no change in cropping pattern as envisaged in the DPR. The farmers under the command area of the project continued with the cultivation of traditional crops in the absence of assured water.

The Agriculture department accepted the facts and attributed this to failure on the part of the WRD to provide assured water supply for irrigation all around the year *i.e.* all the three seasons as mentioned in the DPRs of each project. It added that the farmers hesitated to take the risk of adopting approved cropping pattern in the DPRs of the projects.

Government stated (November 2021) that in Andhali and Pimpalgaon (Dhale) projects irrigation in command area was not achieved due to incomplete canal distribution network, thus farmers followed traditional cropping pattern. In Purna project, irrigation was provided in all seasons and now the crops like oranges, banana, onion and turmeric were cultivated in command area of the project. In Haranghat and Wagholibuti LISs, while framing the DPR possibility of maximum IP creation was considered and cropping pattern was decided on the basis of water availability and type of soil. However, in actual practice, cultivators were unwilling to follow the projected cropping pattern and the farmers were being motivated and educated to switch to cash crops and to take crops in more than one season so as to increase their socio-economic status. In case of Sondyatola LIS project, farmers were cultivating paddy in the command area and were not interested in cultivating other crops. However, efforts were being made to convince them to cultivate rabi crops.

In view of above, the department failed to provide assured irrigation in the seasons as projected in the DPRs in the case of Haranghat, Purna, Sondyatola and Wagholibuti projects. Thus, the farmers were hesitant to take the risk of cultivating crops as per cropping pattern mentioned in the DPRs.

Recommendation 5: The Government may ensure co-ordination between Water Resources department and Agriculture department in planning and execution of changes required in the cropping pattern as envisaged in the irrigation projects.

2.2.5 Achievement of annual benefits stated in DPR

As per CWC guidelines, the elements of annual benefits include irrigation benefits¹³, pisciculture, animal husbandry, hydropower, catchment area treatment and canal bank plantation. The agriculture produce is a key component of annual benefits for computing the BCR. The achievement of

¹³ Net irrigation benefit is difference of net value of agriculture production in the area to be irrigated under pre-project conditions and net value of agriculture production in the area after completion of the irrigation project.

benefit of agriculture produce in each of the projects is given in **Table 2.2.5** below:

Table 2.2.5: Statement of achievement of benefit of agriculture produce

Sr. No.	Name of the Project	Original Administrative Approval (AA) (Month - Year)	Value of Agriculture produce as per Revised Administrative Approval (RAA)		
			Latest RAA/ Date	Estimated / net value (₹ in crore)	Actual value ¹⁴ (₹ in crore)
1.	Andhali	April 1977	1 st / February 2004	3.20	No irrigation through project
2.	Pimpalgaon (Dhale)	June 1994	3 rd / March 2010	12.17	No irrigation through project
3.	Purna	July 1994	3 rd / March 2016	32.49	15.37
4.	Haranghat	February 1996	1 st / January 2002	13.36	8.77
5.	Sondyatola	May 1995	3 rd / April 2016	39.89	29.29
6.	Wagholibuti	November 1993	3 rd / March 2018	39.33	18.34

Source: Information furnished by the respective divisions

Above table indicates that there were huge gaps in the value of agriculture produce as estimated and actually realised. Further, for want of irrigation as planned in the DPR, crop production could not be increased as detailed below:

Andhali - The first RAA envisaged the net annual benefits from agriculture produce¹⁵ in the command area of project at ₹ 3.20 crore, on the basis of letter of the District Superintendent Agriculture Officer (DSAO), Pune and the prices of agriculture produce were as of 1999-2000. However, no water was made available for irrigation through the canals during the period from 2014-15 to 2020-21 resulting in no net benefit from agriculture produce during the said period.

Pimpalgaon (Dhale) - The third RAA envisaged the net annual benefits from agriculture produce in the command area of project at ₹ 12.17 crore. However, no water was made available for irrigation through the canals resulting in accrual of no net benefit from agriculture produce as the water stored in the dam was being lifted by the farmers from the non-command area.

Purna - Third RAA (March 2016) envisaged the annual value of agriculture produce in post project period at ₹ 32.49 crore. It was observed that paddy drilled, chillies and groundnut as envisaged in the RAA were not produced due

¹⁴ In case of LIS, water account is not prepared and net benefit is not worked out. Actual value in case of the Haranghat, Sondyatola and Wagholibuti LIS projects is difference between value of agriculture produce as per DPR/RAA and value of crops not produced (in the seasons other than kharif). In case of Purna, the actual value was obtained from annual water accounts.

¹⁵ Net benefits from agriculture produce = Cost of agriculture produce after irrigation – Cost of agriculture produce before irrigation.

to lack of irrigation and the actual value of agriculture produce was much lower *i.e.* ₹ 15.37 crore as depicted in the table.

Haranghat - First RAA (January 2002) envisaged the annual value of agriculture produce in the post project period at ₹ 13.36 crore. It was observed that sugarcane and follow on crops envisaged in the RAA were not produced owing to lack of irrigation and the actual value of agriculture produce was only ₹ 8.77 crore.

Sondyatola – Third RAA (April 2016) envisaged the annual value of agriculture produce in the post project period at ₹ 39.89 crore. It was observed that rabi and perennial crops as envisaged in the RAA were not produced owing to lack of irrigation and the actual value of agriculture produce was much lower (₹ 29.29 crore) as against the projected value.

Wagholibuti - The third RAA (March 2018) envisaged annual value of agriculture produce in post project period at ₹ 39.33 crore. It was observed that crops as envisaged in the RAA for rabi and hot weather season were not produced due to lack of irrigation and the actual value of crop yield was ₹ 18.34 crore only.

Government stated (November 2021 and December 2021) that in case of Andhali and Pimpalgaon (Dhale), irrigation was not provided through canals to the farmers and farmers were allowed to lift the water from the reservoir. In case of Purna, the annual benefits *i.e.* agriculture cost from 2014-15 to 2019-20 ranged between ₹ 9.28 to ₹ 35.20 crore. In case of Haranghat, annual benefits as calculated by the department against the actual irrigation provided from 2017-18 to 2020-21 ranged between ₹ 11.57 crore and ₹ 22.37 crore. In case of Sondyatola LIS, due to shortfall in demand for irrigation from farmers for rabi and hot-weather seasons, there was difference in projected and actual crop produced. The annual benefits were realised by producing substantial agriculture produce through all the seasons. In case of Wagholibuti LIS, the annual benefits from 2017-18 to 2020-21 ranged between ₹ 12.90 crore and ₹ 21.16 crores.

Reply of the Government is not acceptable as Andhali and Pimpalgaon (Dhale) projects were planned for providing surface irrigation through canal in the command area of the project, which was not provided. The irrigation by lifting of water from the project reservoir was not provided in the command area of the projects. Hence, in these two projects no net annual benefits were achieved through surface irrigation. In the case of remaining four projects (Haranghat LIS, Sondyatola LIS, Wagholibuti LIS and Purna) the expected benefits *vis-a-vis* projected in the DPRs were not realised.

Thus, in all the projects yield of various crops and annual financial benefits were not achieved as the required water was not provided to farmers for irrigation as envisaged in the DPRs.

Recommendation 6: The Government may ensure that proper surveys are conducted before approving the projects so that the benefits accrue to the intended beneficiaries in a time bound and cost effective manner.

Conclusion

The achievement of intended outcomes of the selected projects was adversely affected by several factors. CWC clearance regarding water availability and inter-state aspects was not obtained by the WRD for the projects. The projects had long gestation periods and none of them were completed in time. Multiple revisions in administrative approvals prolonged the construction phase and there was significant increase in the cost of the projects. All these factors had a cascading effect on timely completion of the projects.

The target of IP creation could not be achieved in any of the six selected projects. The utilisation of the IP actually created was also unsatisfactory. As a result, agriculture production did not increase as planned in the DPRs.

There were significant shortfalls in irrigation of the targeted areas. Cultivation in the command area of the projects was not up to its full potential as estimated in the DPRs. Cropping pattern proposed in the DPRs was not followed by the farmers as assured water was not provided through irrigation. Water for irrigation was not provided in the seasons as provided in the DPRs of each of the projects.