

## Planning

Planning at the macro level as well as micro level is essential for successful implementation of the programme entailing investment of over ₹1.86 lakh crore. Audit review to assess whether planning for the programme was comprehensive, and formulation of individual projects was proper, revealed as under.

### 3.1 Project formulation

While 86 projects were taken up under Jalayagnam on Engineering, Procurement and Construction (EPC) basis during 2004-09, Government has not prescribed any specific procedure for planning and project formulation with regard to these. Therefore, Audit has assessed the comprehensiveness of the planning process and individual project formulation with reference to the Andhra Pradesh Public Works Department Code (APPWD Code), which provides for the following, while formulating any irrigation project.

<b>Preliminary investigation</b>	Report from this stage should contain a general description of the work and estimated cost of the project including <i>inter alia</i> , <ul style="list-style-type: none"> <li>◆ Availability of water, having regard to possible claims of other States to the proposed source and rights of other riparian owners of lands irrigated lower down.</li> <li>◆ Approximate extent of ayacut and its general location.</li> </ul>
<b>Detailed investigation</b>	Report from this stage should include the details required from the preliminary investigation stage, as well as the following key details, among others. <ul style="list-style-type: none"> <li>◆ The ayacut should be definitely fixed by the department with the written concurrence of farmers.</li> <li>◆ Ayacut registers should be prepared village wise.</li> <li>◆ The alignments of the main and minor distributory channels should be fixed.</li> <li>◆ Land plans and schedules for lands to be acquired should be prepared and preliminary notifications under Land Acquisition (LA) Act, 1894 may be issued. However, care should be taken to see that no measures should be adopted which would actually commit the Government to the expenditure on execution of the project.</li> <li>◆ The report on complete investigation should include a revised financial cost. The Officer should exercise very careful foresight in framing estimates of the cost of works.</li> <li>◆ The general description of proposed works should follow, sources of supply of water, quantity of water available at different period of years, quantity proposed to utilize, area of land commanded, average area usually cultivated, area probably irrigable, lengths of main channels and distributaries.</li> </ul>

The I&CAD Department has been following the above prescribed procedure all along while formulating the projects. However, in respect of the projects taken up under Jalayagnam, Government entrusted the responsibility of carrying out the detailed survey and investigation, and design of the projects to the contractors. Feasibility of

the project, including availability of adequate water and overall ayacut to be created, is the responsibility of the Government. During detailed investigation, the contractors are to suggest the exact ayacut feasible, as well the best alignment possible for execution of the project.

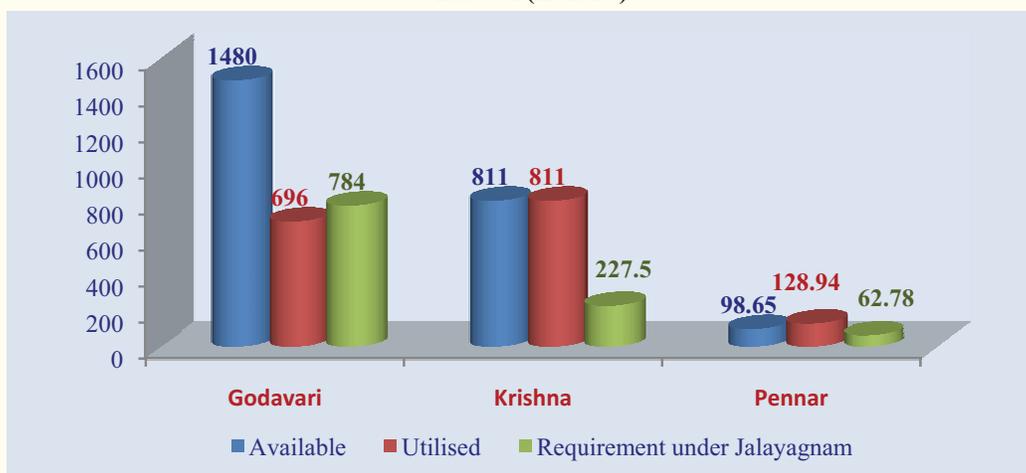
The Department replied (July 2012) that while formulating the projects under Jalayagnam, the foremost consideration was the felt need for having such a project and based on this need, the techno-economic feasibility and viability of a project is assessed. It was further stated that only such projects, which have techno-economic viability, financial concurrence and requisite political will, will be implemented.

Audit scrutiny of the records relating to the 26 test checked projects revealed the following with regard to project formulation.

### 3.1.1 Assessment of water availability

Jalayagnam involved implementation of 74 irrigation projects (excluding flood banks and modernization works) on the three major rivers of the State, viz. Godavari, Krishna and Pennar. The availability of water in these rivers and the requirement for the programme is given below.

Chart-3.1 (in TMC)



Source: Outcome budget of I&CAD Department for the year 2011-12

#### 3.1.1.1 Projects on River Krishna

Audit observations in this regard are as follows.

- i. Water required for successful implementation of the projects taken up under Jalayagnam on Krishna and Pennar is far above the available quantity. Therefore, Government decided to utilize the surplus/flood water in these river systems. However, there was no evidence in the records made available to audit, that the flood data of these rivers was analysed to assess the average number of days where flood flows were available annually. Such an analysis is vital in assessing the chances of success of the projects which are proposed to be solely dependent on flood water, and in deciding,
  - ◆ the number of days when water is proposed to be drawn/pumped;

- ◆ the level/location from where the flood water is to be drawn;
  - ◆ capacity of the intake canals/pumps required to carry water to the ayacut; and
  - ◆ capacity of the storage reservoir to be built.
- ii. Eight out of the 26 test checked projects contemplate using flood water of river Krishna. However, there was no uniformity in the number of flood days adopted for designing these projects, as can be seen below:

Table-3.1

Sl No	Name of the project	Source of water	No. of days proposed for drawal of water
1	Veligonda	Srisailam Reservoir	30
2	Telugu Ganga	Srisailam Reservoir	30
3	Galeru Nagari;	Srisailam Reservoir	30
4	Gandikota Reservoir – CBR Lift Scheme *;		
5	& CBR Lingala Canal *		
6	Handri Neeva	Srisailam Reservoir	120
7	SLBC Tunnel	Srisailam Reservoir	87
8	Nettempadu	Jurala Reservoir	90

\*Gandikota–CBR Lift Scheme proposes to draw Krishna waters from Gandikota Reservoir, which is a part of Galeru Nagari project for utilization in the CBR Lingala Canal. Thus, the requirements of these projects are included in the requirements of Galeru Nagari

Source: DPRs of the concerned projects

- iii. Out of the eight projects mentioned above, the projects at Sl No. 1 and 3 were initially designed to draw the required water in 45 days, and some of the project works were awarded during 2004 and 2005 accordingly. However, the designs of these projects were later revised (May 2006 and November 2006 respectively), and the number of flood days in river Krishna was reduced to 30.
- iv. The Expert Committee constituted by the State Government in July 1997 to examine various alternatives for the Galeru Nagari project observed that the number of flood days on Krishna was only 30 and that too, at only 40 per cent dependability<sup>1</sup>. Considering this observation of the Expert Committee, some of the projects based on Krishna flood water are technically not viable, as the water that can be drawn in 30 flood days would be far less than the requirement of these projects, as shown below:

Table-3.2

Sl No.	Name of the project	Total design discharge of the intake pumps/ canal system	Qty. of water that can be drawn in 30 days <sup>2</sup> (TMC)	Qty of water required for the project (TMC)	Shortage of water (TMC)
1	Handri Neeva	3,850 cusecs	9.979	40.000	30.021
2	Nettempadu	3,000 cusecs	7.776	21.425	13.649
3	SLBC Tunnel	4,000 cusecs	10.368	30.000	19.632

Source: DPRs of the concerned projects

<sup>1</sup> i.e. flood water would be available for 30 days in only 40 per cent of the years

<sup>2</sup> One cusec means a discharge of 'one cubic feet per second'. Thus, the total water that can be drawn in 30 days = {(design discharge of the intake system in cusecs X 30 days X 24 hours X 3600 seconds) ÷ (1,000 X 1,000,000)} TMC

- v. Even though flood water are in addition to allocated water, the chances of availability of flood water of river Krishna are limited, with the upper riparian States of Maharashtra and Karnataka getting allocation of more water under the Award (2010) of Krishna Water Disputes Tribunal (KWDT)-II.
- vi. Further, with every new project taken up on river Krishna, the availability of surplus water would progressively get reduced. Since 1997, the Government of Andhra Pradesh (GoAP) has taken up many new projects which depend on Krishna water like Kalwakurthy (25 TMC), Bhima (20 TMC), Koilsagar (3.9 TMC), etc., in addition to the projects mentioned in Table-3.1 above.
- vii. Although the Planning Commission stipulates that all the projects that have inter-state ramifications should be cleared by the CWC, Government did not obtain CWC clearance for these projects as of September 2012. In fact, CWC did not approve SLBC Tunnel, Galeru Nagari and Veligonda projects, as the GoAP could not establish firm and clear availability of water for these projects. There was no evidence in the records produced to Audit to show that the proposals in respect of Gandikota-CBR lift scheme and the CBR Lingala Canal were sent to the CWC at any stage for approval.
- viii. While the GoI constituted (April 2004) KWDT-II to review the sharing of Krishna waters, GoAP went ahead and took up Galeru Nagari (June 2004), Handri Neeva (July 2004), Veligonda (July 2004), SLBC tunnel (August 2005) and Nettempadu (June 2005) projects on this river, involving a huge investment of ₹23,093 crore.

During the Exit Conference in July 2012, the Department did not contest the observations of the Expert Committee, but stated that the Government is not bound by the observations or recommendations of the Committee. In its written reply (July 2012), the Department stated that as per the Bachawat Award of 1973, the average annual yield in Krishna was 2390 TMC, out of which, 2060 TMC at 75% dependability was allocated among the three riparian states<sup>3</sup> (the share allocated to AP being 800 TMC plus 11 TMC return flows), and that, AP was permitted to utilize the surplus waters. It was further stated that there was a surplus of about 330 TMC on an average (2390 TMC - 2060 TMC), and that, even at 50% dependability, there will be an average surplus of 245 TMC, out of which, 227.50 TMC had been planned to be utilized for the ongoing schemes in Krishna basin.

The reply is not acceptable on account of the following reasons.

- ♦ The KWDT-I (Award of 1973 and further report of 1976) had allowed Andhra Pradesh to utilize the surplus waters, with a rider that AP shall not acquire any right over the surplus waters and nor would it be deemed to have been allocated to AP.

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<sup>3</sup>AP (811 TMC), Maharashtra (585 TMC) and Karnataka (734 TMC)

- ◆ The Supreme Court, while adjudicating between the Governments of Karnataka and AP in April 2000 (in OS No. 1 and 2 of 1997), observed that, “.....the lowest riparian state should not be allowed to proceed ahead with large-scale water projects for utilisation of surplus water in excess of the allocated quantity over which, the State has no right. ....In the context of the expenses involved for such major projects and the national loss, which the country cannot afford to sustain in a federal structure like our country, it is the duty of the Central Government to bear this in mind while sanctioning any such major project of the lowest riparian State .....”.

As regards the inconsistency in the number of days of surplus/flood flows projected for various projects on river Krishna, the Department replied that the entire 110.5 TMC of water required for Telugu Ganga, Veligonda and Galegu Nagari would be drawn during 30 days flood period, and that, out of the total requirement of 117 TMC in respect of Handri Neeva, Kalwakurthy<sup>4</sup>, Nettempadu and SLBC Tunnel, 36 TMC would be drawn from the 30 days flood flows and the remaining 81 TMC would be drawn from the Srisailam and Jurala reservoirs. The Department stated that drawal of this 81 TMC from storage reservoirs would not affect the carry over storage of Srisailam reservoir, since AP can utilize 45 TMC of Godavari water by diverting it from Polavaram to the Krishna delta and that, for the balance 36 TMC, additional storage was being created under Pulichintala project.

The contention of the Department is not acceptable due to the following reasons:

- ◆ Drawal of water by a new project will affect the availability of flows for other existing, ongoing and proposed projects which depend on the same river. However, in the DPRs of all the projects<sup>5</sup> mentioned in Table-3.1, it was stated that the proposed project would not have any impact on other projects since only flood waters are proposed to be utilized.
- ◆ The basis for arriving at the number of days (30/45/87/90/120 days) of availability and drawal of flood waters for these projects was not discussed in the DPRs.
- ◆ Fresh allocation made to the upper riparian States by the KWDT-II will affect the surplus flows available to AP, both in terms of quantity and duration. In the absence of a detailed and scientific study of the flood flows and the duration of their availability, considering the new allocations to the upper States by KWDT-II, and the impact of the combined drawl of water from Srisailam reservoir by all the existing and new projects in AP, the possibility of the projects in question being able to draw the water required to serve the entire contemplated ayacut, without tapping the carryover storage of Srisailam reservoir and adversely affecting the flows available for the projects located on its downstream, is remote.

<sup>4</sup> There is no water allocation to Kalwakurthy LIS also. The project proposes to draw 25 TMC of flood waters in 90 days from Srisailam reservoir

<sup>5</sup> DPRs were not prepared in respect of Gandikota–CBR Lift Scheme and CBR Lingala Canal

- ♦ Jurala reservoir has a live storage capacity of 6.798TMC<sup>6</sup>, while it is expected to supply 63.74 TMC to four projects – Jurala (17.84 TMC), Bhima (20 TMC), Koilsagar (3.9 TMC) and Nettempadu (22 TMC). Therefore, the likelihood of it being able to source the requirements of these projects is not certain.

As regards the impact of further allocations made to the upper riparian States by KWDT-II, the Department, while accepting the audit observation that there could be a reduction of surplus flows in Krishna in AP due to the Award of KWDT-II, stated that the Dummugudem – Nagarjuna Sagar Tail Pond project was envisaged to divert 165 TMC of flood waters of Godavari keeping in view such a future exigency, to make the projects on Krishna functional at higher success rate than would be possible with surplus waters alone.

- ♦ The technical viability of Dummugudem - Nagarjuna Sagar Tail Pond project, which depends on flood waters of Godavari, has not yet been established.

### **3.1.1.2 Projects on River Godavari**

Three lift irrigation schemes (LIS) were taken up on river Godavari without ensuring availability of adequate water, as discussed below.

#### **(i) Indirasagar Dummugudem**

Water for the Indira Sagar Dummugudem project would be available only if the dam of Polavaram project is constructed with a Full Reservoir Level (FRL) of EL +45.72 m and water is impounded in that reservoir. However, this project was taken up in 2007, when the design of the Polavaram dam was not yet finalized by CWC and the project was embroiled in inter-state disputes and litigations relating to submergence of tribal areas in the neighbouring States.

The Department replied that the Indira Sagar Dummugudem project was taken up on the presumption that the Polavaram project would be completed at the same time as this project and accordingly, the drawl point of the scheme was fixed at +45m, i.e. within the water spread area of the Polavaram reservoir. It was further stated that keeping in view the delay in completion of Polavaram headworks, it is now proposed to excavate an approach channel from a lower elevation and also to construct an auxiliary pumphouse to lift water directly from River Godavari.

The reply confirms the audit contention that the project was taken up prematurely without proper studies. In fact, even after the lapse of over four years since sending the project proposals to the CWC, the Government had not been able to establish the availability of water for this project and the CWC had returned (January 2012) the project proposals citing the same reason.

#### **(ii) Rajiv Dummugudem**

Rajiv Dummugudem project was also taken up (June 2007) without obtaining clearance from the CWC. The latter did not approve the DPR relating to this project since the impact of this project on the other existing and planned projects was not

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<sup>6</sup> Gross capacity of Jurala reservoir is 11.941 TMC out of which 5.143 TMC is dead storage

analyzed. The CWC stated (October 2007) that since the Polavaram Project was under finalization and simultaneously a number of new projects were being proposed and linked to Polavaram, it would be difficult to consider the proposal in isolation without an integrated study.

The Department replied that sufficient unutilized water is available in Godavari, which is proposed to be utilized for this project, and that, the CWC had given 'in-principle' clearance for the project in June 2007.

The reply is not acceptable since the in-principle consent of CWC is only a preliminary clearance for preparation of DPR and not for tendering and executing the project. Besides, the audit observation is on the taking up of projects without the requisite studies. Further, despite a lapse of five years since the DPR was sent (September 2007) to the CWC, the Department has not established the exact quantum of water available for the project. The CWC has not approved the proposal till date (July 2012).

### (iii) **Uttarandhra Sujala Sravanthi**

This project contemplates lifting 63.20 TMC of flood water from river Godavari at Purushottapatnam in East Godavari district to create an ayacut of 8 lakh acres in Visakhapatnam, Vizianagaram and Srikakulam districts of north coastal AP. The project proposes to pump the Godavari flood water for a period of 90 days from the downstream of Polavaram project. Availability of water for this project can be established only by assessing the net surplus flows that would be available after taking into account the proposed water draws for the ongoing projects like Polavaram, Indira Sagar Dummugudem, Rajiv Dummugudem, Dummugudem-Nagarjunasagar Tail Pond, Pranahita Chevella, Devadula, Yellampally, Sriramsagar (Stages-I & II), etc. However, availability of water even for the ongoing projects on Godavari is yet to be established.

The Department replied that there would inevitably be wastage of water below Polavaram project into the sea and that the data of flood waters flowing past the Dowlaiswaram barrage for a period of 40 years from 1965 to 2005 shows the water availability. The reply is not acceptable since it takes into account surplus flows available, without reckoning the ongoing projects on Godavari.

#### **3.1.1.3 Projects on River Pennar**

The following two testchecked projects which contemplate using Pennar water also did not have dependable water source.

##### (i) **Somasila Project and Somasila-Swarnamukhi Link Canal**

- Extension of the Gottipati Kondapa Naidu (GKN) Canal of Somasila project was taken up under Jalayagnam (May 2006) to create a new ayacut of 40,000 acres besides stabilizing 18,500 acres of the existing ayacut. There is no assured availability of water for the proposed expansion of this project, as the utilization of Pennar water by the already existing projects (128.94 TMC) was in excess of the water allocated to the State (98.65 TMC).

- ♦ The Somasila-Swarnamukhi Link Canal (SSLC) proposes to draw 4.45 TMC of Pennar flood water from the Somasila-Kandaleru Flood Flow Canal (SKFFC) and carry it to Mannasamudram tank to create a new ayacut of 23,266 acres and to stabilize an ayacut of 87,734 acres existing under 316 tanks in Nellore and Chittoor districts, besides providing drinking water facilities to various Mandals enroute. Since the SKFFC itself depends on flood water and does not have assured water source, the possibility of providing assured water for SSLC is open to question.

As regards availability of water for GKN canal of Somasila project and the SSLC, the Department replied that the observed yield of river Pennar at Somasila project after deducting the upstream utilization was 50.38 TMC at 75 *per cent* dependability and 92.65 TMC at 50 *per cent* dependability, and that, after meeting the requirements of Somasila project (48.543 TMC), additional water of 44.11 TMC would be available, which would be utilized in the following manner:

**Table 3.3**

Sl. No.	Project component	Proposed utilization
1	Telugu Ganga Project (Kandaleru component)	30.00 TMC
2	Somasila Swarnamukhi Link Canal	4.45 TMC
3	GKN Extension of Somasila Project	3.91 TMC
4	Difference in Somasila Reservoir	5.21 TMC
5	For new additional uses over original proposals and drinking water	1.60 TMC
	<b>Total</b>	<b>45.17 TMC</b>

It was further replied that additional storage of about 130 TMC has been created at Somasila and Kandaleru, which would cater to all the above projects at 50 *per cent* success and would also keep some carry over storage in surplus years for use in the following years and improve the success rate of these projects.

#### (ii) Chitravathi Balancing Reservoir (CBR) Right Main Canal

At the time of commencement of Jalayagnam, the Chitravathi Balancing Reservoir (CBR) was under construction on river Chitravathi, a tributary of Pennar, to augment irrigation to an ayacut of 60,000 acres already existing under the Pulivendula Branch Canal (PBC). Later, under Jalayagnam, Government took up (June 2004) the right main canal of CBR (called the Lingala Canal) with the objective of providing irrigation to 25,000 acres in Kapada District. Later, this was increased to 59,400 acres by utilizing 3.60 TMC of water, assumed to be available in the CBR<sup>7</sup>. However, as per the I&CAD Department's records, the PBC was unable to serve even 25 *per cent* of its existing ayacut due to insufficient inflows from river Chitravathi (including the flows from the TBPHLC<sup>8</sup>). In fact, the inflows never exceeded 2.16 TMC during the

<sup>7</sup> The capacity of CBR was 10 TMC. Out of this, the water required for the already existing Pulivendula Branch Canal (PBC) System was 6.40 TMC. The remaining water of 3.60 TMC was proposed to be utilized for the Lingala canal system

<sup>8</sup> The Pulivendula Branch Canal (PBC) is at the tail end of the Tungabhadra Project High Level Canal (TBPHLC) system. The water from TBPHLC flows into the Chitravathi river and after travelling for a length of 11.5 KM in that river, the water is diverted into the PBC

previous 22 year period (1982-83 to 2004-05) and the average annual release was a meagre 1.26 TMC.

Later, in December 2006, to supplement water to CBR from other sources, the GoAP took up a lift scheme from Gandikota reservoir at a cost of ₹2,059 crore. However, supplementation from Gandikota Reservoir also remains a question since the Gandikota Reservoir (which is a part of Galeru Nagari project) itself does not have assured water since it is dependent on flood waters of Krishna. As of September 2012, an expenditure of ₹300.57 crore had been incurred on Lingala Canal, the success of which is not assured.

The Department in its reply agreed that there were insufficient inflows in Chitravathi including the flows from TBPFLC. The reply does not address the question as to why Lingala Canal was taken up without any detailed studies, despite the fact that there was no water for the project.

### 3.1.2 Identification of targeted ayacut

Government did not identify the specific villages where the ayacut was proposed to be developed under the projects taken up in Jalayagnam. Only Mandals were identified in the targeted districts. Further, the extent of ayacut proposed in each Mandal was also not identified.

The Department replied (July 2012) that under the contracting system adopted in Jalayagnam, the task of conducting detailed survey and investigations and also identification of the target ayacut has been entrusted to the contractors, and that, the details of village wise ayacut would be known only after finalization of ayacut registers after completion of detailed survey and investigations by the contracting agencies.

Audit scrutiny of the ayacut details in the test checked projects revealed the following.

- i. **Telugu Ganga:** As per the DPR of 1983, the ayacut proposed under Sree Pothuluri Veerabrahmendra Swamy Balancing Reservoir (SPVBR) in Kadapa district, which is a part of Telugu Ganga Project, was 1.50 lakh acres. While taking up the works under Jalayagnam, the proposed ayacut was increased to 1.62 lakh acres by adding additional ayacut under subsidiary reservoirs I and II. As of July 2012, a total ayacut of only 1.3 lakh acres was identified, leaving a shortfall of 30,952 acres. The details of shortfall and the reasons are given below.

**Table-3.4**

Package	Target ayacut	Shortfall	Reasons
II	65,600 acres	5,384 acres	Shortage in block ayacut
III	96,303 acres	14,518 acres	Already covered under the existing tanks
		5,157 acres	Coming under submergence of Somasila Project
		5,893 acres	Due to extension of Municipal/Panchayat agglomeration area and environmental reasons
<b>Total</b>	<b>1,61,903 acres</b>	<b>30,952 acres</b>	

Source: Project records

This indicates that the works were awarded without conducting adequate survey to assess the availability of the ayacut. The Department is yet to adjust the contract prices for the reduction in the distributary network, the estimated cost of which was ₹28.79 crore (@ ₹9,300 per acre).

The Department replied that payments to the contractor for distributary network will be made only for the ayacut created on acre basis as per the agreement which has a clause for reduction in ayacut upto 20 *per cent*. The reply does not address the issue relating to deficiencies in identification of target ayacut. Further,

- ◆ The accuracy of bid amount will be affected if the ayacut details are not clearly spelt out in the DPR;
- ◆ There is a possibility of overlap of projected ayacut across multiple adjoining irrigation projects, which could affect the accuracy/ validity of the potential economic benefits.

Specific issues relating to ayacut of individual test checked projects are discussed under key issues in Chapter 5.

### 3.2 Clearances for the projects

As per the guidelines of the Planning Commission and the CWC for ‘Submission, Appraisal and Clearance of Irrigation and Multipurpose Projects’, for all the major and medium irrigation projects which are proposed on inter-state rivers or their tributaries, investment clearance is to be accorded by the Planning Commission.

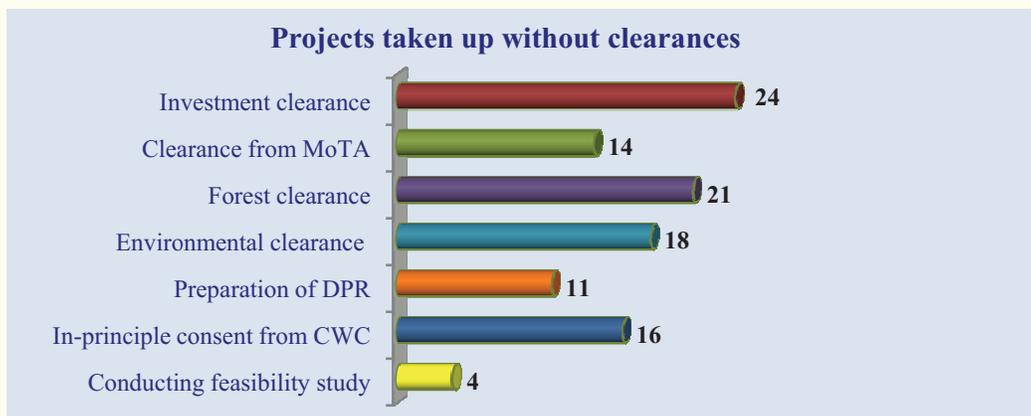
The stages involved in investment approval for any major or medium irrigation project are as follows:

Requirement	Description
<i>Preliminary (Feasibility) Report</i>	Should contain brief chapters on general data, irrigation planning, inter-state issues, survey & investigations including hydrological, geological, seismic, preliminary assessment of environmental aspects etc.
<i>In-principle approval of CWC</i>	In respect of the projects proposed on inter-state rivers or their tributaries, the preliminary/feasibility report has to be sent to the CWC, which examines the basic soundness of planning of the proposed project, and if found acceptable, gives ‘ <b>in-principle</b> ’ consent for preparation of DPR.
<i>Preparation of Detailed Project Report (DPR)</i>	To be prepared after detailed surveys and investigations in accordance with applicable guidelines issued by GOI, MoWR/ CWC
<i>Clearance from MoEF and MoTA (where required)</i>	Environment Impact Assessment and Forest area being utilized/ diverted is to be discussed in detail (MoEF). Tribal population being affected would be examined and R&R plans cleared (MoTA)

Requirement	Description
Submission of DPR to CWC	The final estimate should be based on finalized designs and details of civil and hydraulic structures and economic analysis
Clearance by Technical Advisory Committee	Technical clearance for the project will be given by CWC
Investment clearance by Planning Commission	Investment Clearance by Planning Commission for inclusion in the Five Year Plan/Annual Plan

Out of the 26 projects test checked by Audit, tenders were invited/works were awarded without fulfilling these requirements in several cases. While the details of the projects and current status (July 2012) of clearances are given in *Appendix-3.1*, the status of clearances as on the date of award of works is depicted below.

Chart-3.2



Source: Compiled from records of I&CAD Department

Some of the specific instances observed during test check with regard to these clearances are discussed below:

### 3.2.1 In-Principle clearance and Feasibility study

- i. **Uttarandhra Sujala Sravanthi:** This project is expected to irrigate 8 lakh acres in upland areas of Visakhapatnam, Vizianagaram and Srikakulam districts at an estimated cost of ₹7214 crore. As of September 2012, it is still in the preliminary investigation stage. Feasibility study report, stated to have been prepared in November 2008, was not produced to Audit. DPR for the project has not yet been prepared. Though the Department stated that BCR of the project was worked out at 1.62, the calculation sheets were not furnished to Audit. In fact, even the preliminary study report of this project has not been sent to CWC for grant of ‘**in principle**’ clearance, though the project is proposed on river Godavari, which is an inter-State river and the approval of CWC is a pre-requisite for obtaining investment clearance from the Planning Commission. Further, although, as per the preliminary estimates of the Department, the project requires diversion of about 16,278.74 acres of forest land, proposals for forest clearance have not been submitted to MoEF. However, tenders for six packages were invited in February 2009 and till September 2012, the tenders were neither opened nor cancelled.

- ii. **CBR-Lingala canal:** Neither a feasibility report nor a DPR was prepared for Lingala Canal before awarding the works. However, a feasibility report was prepared for micro-irrigation system. The dates of preparation and approval of even this report were not forthcoming from the records furnished to Audit.

The Department replied that in the EPC contract system, detailed investigation is done by the executing agency and in view of the urgency felt by the Government to start the works, the DPR was not prepared. It was further stated that since the scheme was taken up with flood water, no feasibility report was prepared. The reply is untenable. In the EPC contracting system being followed by GoAP, only detailed engineering is entrusted to the contractors and the Department should have established the feasibility of the overall project including the availability of flood water, the primary requirement for the project, before entrusting the works. While the reply confirms that the Government awarded the works without establishing water availability for the project, it is pertinent to mention that the CE sanctioned an estimate with increased scope of the project, invited tenders and awarded (October 2004) the works for ₹148.05 crore, contrary to the administrative approval given by the Government for ₹32 crore.

### 3.2.2 Preparation of DPR

- i. **Gandikota-CBR Lift scheme:** Works relating to this project were awarded without preparing a DPR. One of the components under the project was improving an existing anicut, viz. Goddumarri anicut, constructed across the river Chitravathi in Anantapur district in 1977, from a capacity of 0.0174 TMC to 0.07 TMC. The cost of this component was estimated at ₹4.14 crore and was included in one of the lift packages (L1-04) entrusted (August 2007) to an agency.

The designs for improvement of the existing anicut submitted by the agency required several modifications. The expert committee headed by the CE,CDO while scrutinizing the designs, concluded that modifications to the existing structure were detrimental to the functioning of the structure and the stability and safety. The committee finally proposed (May 2008) construction of a new anicut on upstream of the existing anicut.

The Department replied that no DPR was prepared since the scheme was formulated mainly to supply water to the existing ayacut of PBC system and CBR Lingala canal. The reply is not acceptable, since irrespective of whether the project proposes to serve new or existing ayacut, preparation of DPR before taking up a project is critical in firming up the techno-economic feasibility of the project duly covering its design, execution and functional aspects. This project has not received any of the requisite clearances, including in-principle approval of CWC.

### 3.2.3 Forest clearance

- i. **Veligonda:** The alignment of certain reaches of the project is passing through forest areas in Prakasam district and an extent of 3,069.91 hectares of forest land was required for the excavation of the canal. Forest clearance was required for excavation of tunnels also, since the tunnels were being excavated beneath the

Rajiv Wild Life Sanctuary. However, contracts were awarded and the works are being executed without obtaining forest clearance.

The Department replied that Stage-I clearance was obtained and lands required for compensatory afforestation had been identified, and that, these would be handed over to Forest Department.

*ii. Somasila:* In South Feeder channel of this project, water was being released only upto Km 58.700 since 2004, due to non-construction of an aqueduct at Km 58.720. The aqueduct was not constructed due to non-receipt of forest clearance from MoEF. Despite this, the work of providing CC lining to the SFC and formation of distributory network for irrigating an ayacut of 1,912 acres beyond Km 58.720 was awarded in March 2005 at a cost of ₹28.81 crore. As the forest land was not handed over, the contractor requested and Government approved (June 2011), closure of contract after executing work valuing ₹12.39 crore. Thus, due to non-obtaining of forest clearance, the aqueduct was not completed and the intended objective has not been achieved, even after a lapse of more than six years from award of works.

The Department replied that the issue was before the Supreme Court and that the works would be taken up after receipt of forest clearance.

### 3.2.4 Investment clearance

Two of the projects under Jalayagnam viz. Polavaram and Pranahita-Chevella are being pursued by the State Government with the Government of India for according **National Project** status. While all the clearances have now been received for Polavaram, works relating to spillway and ECRF dam were taken up before clearance of the DPR from the CWC, which later entailed change in the design, resulting in foreclosure of contracts.

Pranahita chevella project was originally estimated to cost ₹17,875 crore (May 2007) and was later revised to ₹38,500 crore (December 2008). All the works relating to the project were awarded between May 2008 and May 2009, while the DPR was submitted in April 2010. There was a mismatch between the time stipulated for completion of the project as per the agreements and the DPR. The numerous changes to the scope of the project (detailed in Chapter 5) and consequent increase in the cost of the project by over 100 *per cent*, could have been avoided, if the Government had ensured preparation of a comprehensive DPR and its approval by CWC.

The Department stated (July 2012) that it cannot afford to wait for fulfillment of these pre-requisites, since this would take an unduly long time, and that, advance action for tendering, contracting and project execution was initiated, alongside action for obtaining of clearances/ land acquisition. It was further stated that, a policy decision was taken to take up the works simultaneously with the process of obtaining CWC clearances and that, water being a State subject, there was no requirement for obtaining prior approval of CWC unless the project involves funding from GoI.

The reply is not tenable due to the following reasons.

- Awarding contracts without comprehensive DPRs (including a reliable and validated assessment of the available water, ayacut, and land requirements) resulted in changes to the scope and specifications, escalation of cost and time budgets in several projects, contractual disputes, foreclosures etc.
- Further, all these clearances are pre-requisites for posing any irrigation project for funding under AIBP and also for according National Project status by the GoI, as per the guidelines of those schemes. Considering that the State Government is pursuing with GoI for granting national project status to Polavaram and Pranahita Chevella, it is imperative that it obtains CWC approval and investment clearance for these projects.
- In the absence of a DPR and clear specifications, both, the Government as well as the contractors, would not be able to estimate the costs involved in completing a project.

### 3.2.5 Economic viability (Benefit-Cost Ratio) of projects

Benefit-Cost ratio (BCR) refers to the ratio between the net annual benefit to net annual cost of the project and tells us whether the proposed project gives value for money invested in it or not. As per the norms fixed by the Planning Commission/CWC, a project is considered economically viable, when the BCR is more than 1.5 in normal areas and more than 1.0 in case of the projects proposed in scanty/drought prone areas.

In the following test checked projects, the BCR will work out to less than one, if the guidelines issued by the CWC are taken in to account.

Table-3.5

Project	BCR as per Govt.		Factors ignored by Govt	BCR taking factors in col.4 in to account
	Initial	Revised		
(1)	(2)	(3)	(4)	(5)
Pranahita Chevella	1.43	---	<ul style="list-style-type: none"> <li>• Capital cost of irrigation component of the project understated</li> <li>• Value of pre-project crop benefits under valued by taking less yield per hectare</li> </ul>	0.97
Handri Neeva	1.80	1.32	<ul style="list-style-type: none"> <li>• Net annual benefits overstated by ₹647.68 crore</li> <li>• Reduced project cost taken for calculation</li> <li>• Crop benefits taken on maximum prices rather than average prices</li> <li>• Loss in agricultural produce under estimated</li> </ul>	0.86
Nettempadu	2.00	1.65	<ul style="list-style-type: none"> <li>• Cost of distributory network under stated</li> <li>• Interest on capital cost computed @ 6% instead of applicable rate of 10%</li> <li>• Power charges taken @ 20 paise per KWH instead of tariff fixed by APERC @ ₹2.41 per KWH for 2004-05</li> <li>• A number of cost components were not included in the project cost</li> </ul>	0.87
Galeru Nagari	1.93 (1990) 1.63 (1993)	2.023 (2006)	<ul style="list-style-type: none"> <li>• Interest on capital computed @ 4% instead of applicable rate of 10%</li> <li>• Project cost has now increased to ₹7,216.36 crore as against ₹4,541.29 crore considered for computing BCR</li> <li>• Pre-project crop benefits ignored</li> </ul>	0.96

Source: DPRs of the projects and records of I&CAD Department

### 3.3 Requirement of Power

Lift irrigation schemes (LIS) require electricity for running the motors and pumps to provide water to the ayacut. Therefore, assured availability of adequate power assumes importance in planning and execution of LIS.

Out of the 74 irrigation projects taken up under Jalayagnam, 31 are LIS (involving a cost of ₹1,18,996 crore). The combined ayacut contemplated under these projects is 95.39 lakh acres<sup>9</sup>. As per the information furnished by the Department (July 2012), the total power required for these 31 new LIS is 8,746.37 MW<sup>10</sup> with a requirement of nearly 210 million units (MU) per day. Details are given in *Appendix-3.2*.

Audit observations in this regard are as follows:

- i. The total installed capacity of power generation (including private and central sectors) of the entire State as of March 2012 was 16,069 MW<sup>11</sup>. The power required for the new LI schemes, after their commissioning, works out to nearly 54.43 *per cent* of the total installed capacity of the State.
- ii. The total power consumed in the entire State during 2011-12 was 69,848 MU<sup>12</sup>. The 31 new LIS, on their completion and commissioning, are estimated to consume 21,604 MU of power during the pumping season, which works out to 30.93 *per cent* of the total consumption of the entire State, at 2011-12 levels.
- iii. More importantly, during pumping season, the 31 new LIS would require about 210 MU of energy per day, which is more than the average daily energy consumption (of 191.36 MU) of the entire State in 2011-12.
- iv. Andhra Pradesh is a power deficit State and it purchases power from independent power producers every year at high rates. Even if the unit rate of ₹2.60 chargeable by the Power Distribution Companies (approved by the APERC<sup>13</sup> for the year 2011-12) in respect of Government LIS is considered, the total funds required to meet the electricity consumption charges alone for these 31 new LIS works out to ₹5,617.04 crore every year.

The Department replied that out of the total requirement of 8,746.37 MW for the 31 LIS, two projects, i.e. Uttarandhra and Kanthanapally, requiring 329.95 MW and 878 MW, are yet to be taken up, and that, the balance power requirement was 7,538.42 MW. It was further stated that the requirement of the projects already commissioned, either fully or partly, as of March 2010 is only 254.14 MW and that all the remaining LIS are scheduled to be completed only by 2017-18 and that there would not be any

<sup>9</sup> New ayacut: 62.82 lakh acres; and Stabilisation of/Supplementation to the already existing ayacut: 32.57 lakh acres

<sup>10</sup> As per the information furnished by the I&CAD Department earlier (October 2011), the total power requirement was shown as 8,494.30MW. We have taken the revised figures for the purpose of audit analysis.

<sup>11</sup> Thermal: 5092.5 MW; Hydel: 3832.36 MW; Gas: 2766.70 MW; Wind: 228.89 MW; Others: 801.01 MW; Share from Central sector: 3347.54 MW (source: APTRANSCO)

<sup>12</sup> These are the figures of total recorded sales (provisional) furnished by APTRANSCO

<sup>13</sup> Andhra Pradesh Electricity Regulatory Commission

problem in supplying power to these LIS since by that time, the State's installed capacity would be significantly higher.

In its reply, the Department also referred to an assurance given by the APTRANSCO<sup>14</sup> regarding power availability for the LIS including Pranahita Chevella, wherein it was stated that the expected installed capacity of the State would increase to about 19,812 MW by March 2014 as against the estimated total power demand of 17,551 MW, and that power '**may be**' available to all the major LIS.

The reply is not acceptable due to the following reasons:

- ◆ As per the contract period stipulated for the works of all the ongoing LIS, 29 out of the 31 projects (except Uttarandhra and Kanthanapally projects) were originally scheduled for completion by 2014-15 and the power requirement of these LIS would have reached 7,538.42 MW by 2014-15 itself and not by 2017-18 as contended by the Department.
- ◆ In response to a specific query from Audit, APTRANSCO furnished (July 2012) an action plan on power requirements of AP including LIS upto 2016-17, wherein, it projected the capacity addition of 11,100 MW<sup>15</sup> during the period from 2012-13 to 2016-17<sup>16</sup>. As per the information furnished (June 2012) by APTRANSCO, despite the capacity addition, the State would still face energy deficit ranging from 11,339 MU to 32,894 MU during the five year period 2012-17.
- ◆ The increase in availability of power to the State as projected by APTRANSCO was based on assumptions like, capacity addition of 11,100MW including huge addition of 5,212MW of wind and 380MW of solar power in the next five years; reduction of T&D losses from the present level of 18 *per cent* to 14 *per cent* by 2016-17; getting power share from Central generating stations like Vallur, Tuticorin and Neyveli and also from UMPP Cheyyur and UMPP Orissa-II. In the event of non-materializaion of any of these assumptions, the State would be under even more stress to provide the required power to the LIS.

Further, considering the crippling power shortage in the State during the current year (2012), with the gap between the demand and supply being 7413 MU (April to September 2012) (15.34% of total demand for the period), provision of power to all the LIS is a daunting task.

<sup>14</sup> Transmission Corporation of Andhra Pradesh Limited

<sup>15</sup> APGENCO: 3,210MW; CGS: 1,248MW; Wind & Solar: 5,592 MW; Singareni: 1,050MW

<sup>16</sup> 2,768MW in 2012-13; 3,359MW in 2013-14; 1,267MW in 2014-15; 2,466MW in 2015-16; and 1,240MW in 2016-17