

Chapter – 8 Irrigation Planning

8.1 General

The Polavaram – Vijayawada link canal takes-off from stilling basin proposed at the end of right side tunnel with a starting FSL of 40.232 m and runs for 174 km before joining Budameru river upstream of the existing regulator near Velagaluru village near Vijayawada. The water meant for diversion into Krishna river then pass through the existing Budameru Diversion Channel and join Krishna river about 8 km upstream of Prakasam barrage. The FSL of the canal at the tail end is 27.965 m. The link canal irrigates the cultivable and commandable lands lying between its alignment and the existing Eluru canals in Godavari and Krishna Delta systems.

The total culturable command area of the Polavaram - Vijayawada link is 139740 ha. After deducting 7.5% towards watercourses, etc., the net irrigable area comes to 129259 ha. Out of this, an area of 121232 ha is commanded by gravity while 8027 ha is by a lift of 23 m. Out of the total CCA under Polavaram - Vijayawada link canal, 99755 ha is irrigated by bore wells, tanks and open head channels taking off from the river courses and 4032 ha is covered by dry lands presently under rainfed cultivation. There is an un-irrigated area of 35953 ha.

After Polavaram project is completed, the ayacut lands of Yerrakalva reservoir and Nagarjunasagar Left Bank Canal will be tagged on to the link canal and the water thus saved can be utilised for irrigating lands in the upland area.

The existing wet ayacut under tanks and channels is not receiving adequate supplies in time for the growth of the crops since the rainfall in the command is erratic and also due to the reduction in capacities of the tanks consequent on siltation. The existing irrigation supplies to the crops is, therefore, far from satisfactory, with the result, the crops in this area are failing periodically. The Polavaram project waters are proposed to be supplied to the full requirement of crops, without depending upon the erratic rainfall and the flashy flows of streams, in the command areas.

8.2 existing cropping

The existing cropping pattern in the command area showing both Irrigated and un irrigated areas under each crop is given in Table 8.1. Rice is the predominant crop covering 43.93% of the net area sown, followed by sugarcane crop covering 6.75% of the net area sown.

Table 8.1
Irrigated and unirrigated areas under each crop

Sl. No.	Crops	Irrigated crops		Un-irrigated crops		Total	
		Area	%age of net area sown	Area	%age of net area sown	Area	%age of net area sown

1	Rice	60672	43.42	713	0.51	61385	43.93
2	Sugarcane	9258	6.63	170	0.12	9428	6.75
3	Fruits & Vegetables	3297	2.36	648	0.46	3945	2.821
4	Bajra	2365	1.69	201	0.13	2566	1.82
5	Pulses	6150	4.40	1465	1.05	7615	5.45
6	Ragi, Jowar & Maize	188	0.13	--	--	188	0.13
7	Chillies	2972	2.13	25	0.02	2997	2.15
8	Oil seeds	6786	4.86	810	0.57	7596	5.43
9	Tobacco	1728	1.24	--	--	1728	1.24
10	Other crops	6339	4.54	--	--	6339	4.54
11	Unirrigated area to be developed	--	--	35953	25.74	35953	25.74
	Total	99755	71.40	39985	28.60	139740	100.00

The source wise irrigation details in the command area are given in Table 8.2. 21.16% of the irrigated area is served by open head channels, 20.45% by tanks and 43.38% by wells and the balance 15.01% by other sources.

Table 8.2

Source-wise Irrigation details in command area in ha

Sl. No.	Taluk in Command area	Canals	Tanks	Tube wells & filter wells	Other wells	Other sources	Total Irrigated area
1	Polavaram	669	631	1100	7	24	2431
2	Kovvuru	5078	5986	31593	80	1839	44576
3	Tadepalligudem	--	3033	5022	--	--	8055
4	Eluru	6457	7622	3834	867	5	18785
5	Nuzvid	998	1299	--	81	1712	4090
6	Gannavaram	6228	1372	315	85	10716	18716
7	Vijayawada	1676	460	40	244	682	3102
	Total	21106	20403	41904	1364	14978	99755
	Percentage to irrigated area	21.16	20.45	42.01	1.37	15.01	100.00

8.3 Soil Surveys

8.3.1 Soil Capability Classification

The terrain through which the alignment passes is undulating and the horizon is broken up here and there by hillocks. The general soils of the tract are river alluvium, red earth, and black cotton and are best suitable for both wet and dry crops under the irrigated condition. The predominant crops grown are paddy and sugarcane.

8.3.2 Land Irrigability Classification

No detailed soil surveys for land Irrigability classification have been conducted so far in the area under consideration. Based on the information provided by State Soil Survey Agency, the soils in the area may broadly be classified as black soils, red soils, forest soils and alluvial soils. The black soils have mainly been developed from basaltic traps and are either deep black soils to black cotton soils or the shallow black soils that may be either calcareous or non-calcareous. The red soils are either shallow or deep with texture varying from sandy to loamy. While the black soils are generally neutral to alkaline in reaction, the red soils are in general acidic in nature. The alluvial soils are normally located at the delta area of the rivers as well as all along the river courses. These soils are generally rich with regard to nutrient status and contain relatively higher content of finer fractions. Since no detailed soil surveys have been conducted in the area, it may not be possible to assign specific land Irrigability class to each soil group found in the command. However, based on general physiochemical characteristics of these soils, it may be pointed out that deep to very deep soils can be brought under irrigation provided the depth of water table, soil slope and drainage do not become limiting factors. In addition, appropriate soil and water management practices have to be adopted to make irrigation a success. While proposing the cropping pattern the soils available in the command area, the existing cropping pattern and the local practices prevailing in the area are taken into account.

8.4 Proposed Cropping Pattern

The gross command area under Polavaram - Vijayawada link canal is 162691 ha. After making deductions towards forest area, high lands, village sites, tank beds, roads, etc., the culturable command area is arrived at, which is 139740 ha.

Paddy, sugarcane, chillies and pulses over paddy have been proposed by the State Government in the detailed project report on Polavaram project Right Main Canal. These crops have been suggested taking into account the soils available in the command area and considering the local practice to grow paddy and other allied crops on irrigated land. It has also been indicated that the extent of kharif and rabi crops, distributary-wise, would be finalised at the time of localisation.

However, after taking into account the soils available, the agroclimatic conditions and the local practices, a broad cropping pattern as given in Table 8.3 is suggested by NWDA. A crop intensity of 150% is proposed.

Table 8.3
Proposed cropping pattern for en route irrigation

Crop	Percent of CCA
Kharif	
Paddy	36.0
Jowar	12.0
Pulses	6.0
Groundnut	6.0
Chillies	12.0
Cotton	6.0
Maize	6.0
Rabi	
Paddy	12.0
Fodder	6.0
Wheat	12.0
Pulses	9.0
Oilseeds	12.0
Vegetables	9.0
Perennial	
Sugarcane	6.0

8.5 Crop Water Requirement

The water requirements for irrigating the proposed areas have been computed on climatological basis. The data of two IMD observatories located at Kakinada and Sironcha are considered. Normal monthly values of potential evapotranspiration at Kakinada and Sironcha IMD observatories computed by Penman's method are given in the IMD publication "Potential Evapotranspiration (PE) over India" (Scientific report No. 136 Feb. 1971). These have been used in estimating the net water requirements of different crops considered in the suggested cropping pattern. The gross irrigation requirements for different crops have been worked out considering an irrigation efficiency of 55% for the crops other than Paddy and in case of Paddy an irrigation efficiency of 65% is considered.

8.6 Water Planning

The annual gross yield at 75% dependability has been estimated at 14879 Mm³ for the Godavari catchment between Inchampalli and Polavaram projects. Considering import (1499 Mm³) from natural flow of water from Indravati to Sabari through Jauranala, regeneration (702 Mm³), export from Sabari to Indravati (652 Mm³) and upstream utilisation (6415 Mm³) the net water available at Polavaram is 10013 Mm³. The proposed utilisation through Polavaram is 8233 Mm³ including proposed diversion (5325 Mm³) through Polavaram - Vijayawada link canal. To establish the feasibility of the Polavaram reservoir to meet all the requirements with the required rate of success, a detailed simulation is carried out for a period of 30 years from 1951-52 to 1980-81 on a monthly basis as explained in Chapter on **Hydrology**.

The maximum quantity diverted through the Polavaram - Vijayawada link canal will be in the month of July and is of the order of 951 Mm³. From the working table it is seen that the Polavaram reservoir with FRL of 45.72 m with gross storage of 4945 Mm³ (after 50 years of sedimentation) is in a position to cater to all the demands with the success rates envisaged.

8.7 Transmission Losses

Considerable amount of water is lost through evaporation and seepage in the canal system from the head of the canal up to the canal outlet where the water is delivered to watercourse. These losses, commonly known as conveyance losses or transmission losses, have been estimated as 260 Mm³ for the link canal considering 0.60 cumec per million square metre of wetted area of the canal as per Bureau of Indian Standard Code IS: 10430 – 1982.