

A VISIT REPORT ON
SARDAR SAROVAR DAM



CIVIL 4th SEM

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The Narmada River



Narmada means 'ever-delightful', one of the holiest rivers in the country of India

- ✚ It is the largest westward flowing river in India.
- ✚ It is starting from amarkantak rock which is situated near at Jabalpur in Madhya Pradesh.
- ✚ Its coverage area is Chhattisgarh, Madhya Pradesh and Gujarat.
- ✚ It is 1300k.m long and at last is meet to the Arabian Sea near Bharuch.
- ✚ Its branch river length is around 200k.m.
- ✚ There was many dams are constructed on the Narmada river. Like Bargi, Tawa, Narmada Sagar, Omkareshwar, Maheshwar and Sardar Sarovar.

So, we are study about Sardar Sarovar dam in detail.

DESCRIPTION



■ Location

- State : Gujarat
- District : Narmada
- Taluka : Nandod
- River : Narmada

■ Reservoir:

- Full reservoir level: 138.68 m.
- Maximum water level: 140.21 m.
- Minimum draw down level: 110.64 m.
- Normal tail water level: 25.91 m.
- Submergence at F.R.L 138.68 m: 34867 ha.

■ Dam:

- ❑ Type: concrete gravity
- ❑ Length of main dam: 1210.02 m.
- ❑ Top R.L. of dam: 146.50 m.
- ❑ Maximum height above deepest foundation level: 163.00 m.
- ❑ Spillway:
 - ▶ Type: ogee
 - ▶ Energy dissipation arrangement: Stilling basin with Sloping apron
 - ▶ Crest level of spillway: R.L.121.92 m.
 - ▶ Gates:
 - ☀ Type: Radial
 - ☀ Number and size: 7 nos.
 - 18.30 m × 18.30 m
 - 23 nos.
 - 18.30 m × 16.76 m
 - ▶ Spillway capacity: 84949.25 cumec (30 lakh cusec)

■ Power installation:

	<u>River bed power house</u>	<u>Canal head power house</u>
❑ Number of unit:	6	5
❑ Rated capacity		
Of each unit:	200 mw	50 mw
❑ Installed capacity:	1200 mw	250 mw
❑ Type of turbine:	Francis vertical (Reversible)	Kaplan (Convention surface)
❑ Type of power		
House:	Underground	Surface

Canal system:

- ❑ F.S.L at H.R: 91.45 m (300 ft.)

- ❑ Main canal:

 - ▶ Length: 460 km.

 - ▶ Base width in head reach: 76 m.

 - ▶ F.S.D in head reach: 7.6 m.

 - ▶ Discharge capacity in head reach: 1132.66 cumec
(40,000 cusec)

 - ▶ Type of canal: Lined contour canal



Sardar Sarovar Project

General

This Project report includes the brief summary, technical features and requirement importance of the sardar Sarovar Project.

About Narmada Basin and Narmada River

The Narmada, the largest flowing Westward, rises near Amarkantak range of mountains in Madhya Pradesh. It is the fifth largest river in the country and the largest one in Gujarat. It traverses Madhya Pradesh, Maharashtra and Gujarat and meets the Gulf of Cambay. The total length of the river from source to sea is 1312 kilometers (815 miles) while the length up to dam site is 1163 kilometers. (723 miles). The width of the river channel at dam site during high floods is 488 meter (1600 feet) and that during summer is 45.70 meter. (150 feet) . The maximum recorded flood on 7th September 1994 was 70,847 cusecs (2.5 million cusecs) while minimum recorded flow in summer was 8.5 cusecs (300 cusecs.) The dam is designed for 87,000 cusecs (3.07 million cusecs) flood.

The total basin area of the river is 97,410 square kilometer comprising 85,858 square kilometer in Madhya Pradesh, 1658 square kilometer in Maharashtra and 9894 square kilometer in Gujarat. The drainage area up to dam site is 88,000 square kilometer. The mean annual rainfall in the basin is 112 centimeters. The annual run of the dam site at 75 percentage of dependability is 27.22 MAF. The World Bank computed the yield of 28.57 MAF while the yield computed in May 1992 by the Central Water Commission, Government of India is of 26.60 MAF, i.e. about 27.00 MAF. The utilisation of Narmada River basin today is hardly about 10%. Thus water of the Narmada continue to flow to the sea unused.

Need For Sardar Sarovar Project

Post 2nd World War 20th Century is marked by end of colonial era. Countries - small and big, after attaining political freedom, embarked on ambitious programme of economic development. The twin problem of under employment and poverty has been the most difficult challenge they have been facing. They are no doubt endowed with diverse natural resources, which have remained unharnessed. Burgeoning population has thrown up army of unemployed young people who are asset if gainfully used, but an explosive liability if kept idle. The crucial task for the planners and leaders of these countries is to channelise the unharnessed natural resources - land, water, minerals, forests, sea wealth and so

on and the idle manpower so as to transform them into productive wealth for the people.

Dam		
1	Length of main concrete gravity dam	1210 m
2	Maximum height above deepest foundation level	163 m
3	Top R.L. of dam.	146.50 m
4	Catchment area of river above dam site	88,000 Sq. km
5	Live storage capacity (4.7 MAF)	0.58 M.Ha.m.
6	Length of reservoir	214 km
	Maximum width	16.10 km
	Average Width	1.77 km
7	Spillway gates	
	Service Spillway	23 Nos. 60' x 55'
	Chute Spillway	7 Nos. 60' x 60'
8	Spillway Capacity	87,000 cumecs (3.07 million cusecs)



Main Features of Dam

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Main Features of Power House

<u>Power Houses</u>		
1	<u>River bed power house</u>	1200 MW
2	<u>Canal head power house</u>	250 MW

There are two power houses for the Sardar Sarovar Project (SSP). (i) 1200 MW River Bed Power House and (ii) 250 MW Canal Head Power House. Power benefits are shared among Madhya Pradesh, Maharashtra and Gujarat in the ratio of 57:27:16 respectively.

River Bed Power House

Canal Head Power House

Main Features of Canal System

Canal System		
Main Canal		
1	Full supply level (F.S.L.) at H.R.	91.44 m (300 ft)
2	Length up to Gujarat - Rajasthan border	458.00 km
3	Base width in head reach	73.01 m
4	Full supply depth (F.S.D.) in head reach	7.60 m
5	Design discharge capacity	
	(1) In head reach	1133 cumecs (40,000 cusecs)
	(2) At Gujarat Rajasthan border	71 cumecs (2,500 cusecs)

Narmada Main Canal is a contour canal. It is the biggest lined irrigation canal in the world. It is about 458 km. long up to Gujarat - Rajasthan border. It has a capacity to flow 1133 cumecs (40000 cusecs) at its head-at kevadia and reducing to 71 cumecs (2500 cusecs) at the Gujarat -Rajasthan border. The canal extends further in the state of Rajasthan to irrigate areas in Barmer and Jhalore districts of Rajasthan. The cross section of the canal, at its head is 73.1m x 7.6m (Bed width x Full supply depth), with 2:1 inner side slope. It has a velocity of water in the initial reach is 1.69 m/sec. The Main Canal is lined with plain cement concrete to minimise sippage losses to attain higher velocity and to control the water logging in future. The lining work is carried out with the mechanized pavers. Such a large scale paving of concrete lining is done for the first time in India.

Narmada Water Dispute Tribunal (NWDT) Award

The plan for harnessing the river for irrigation and power generation in the Narmada basin, was initiated in 1946. Seven projects including the Bharuch project were identified during the initial survey, and 4 projects- Bharuch (Gujarat), Bargi, Tawa and Punasa in Madhya Pradesh- were given top priority for investigation. After the completion of investigation, the proposed dam at Gora in Gujarat with the full reservoir level (FRL) 161 feet (49.80metres) was selected and the foundation stone was laid by Pandit Jawaharlal Nehru on 5th April, 1961. However, as more detailed and modernised contour sheets from the Survey of India were available , the possibility of raising the height of the dam, for optimum utilisation of water, was considered.

In 1964, to resolve the dispute about sharing of the Narmada Water between the governments of Gujarat and Madhya Pradesh, the government of India appointed an expert committee under the Chairmanship of late Dr. Khosla which recommended a higher dam with FRL 500 feet (152.44metre) in 1965. However, no agreement could be arrived at and the Narmada Water Dispute Tribunal (NWDT) was constituted by the Government of India in 1969, under the Inter State River Water Disputes Act, 1956.

Definition of NWDT

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The NWDT was headed by sitting judge of the Supreme Court of India, the other two member being member of two High Court.

Decisions of NWDT

1	Allocation of water :		(A 75% dependable yields)	
			Allocation in MAF	
	Madhya Pradesh		18.25	
	Gujarat		9.00	
	Maharashtra		0.25	
Rajasthan		0.50		
		Total : 28.00		
2	Height of the dam :			
	FRL at	RL 455.00 feet	(138.68 meters)	
	MWL at	RL 460.00 feet	(140.21 meters)	
3	Full Supply Level of the Main Canal.			
	FSL at	RL 300.00 feet	(91.44 metres)	
4	Power allocation		Allocation in Percent	
	Madhya Pradesh		57	
	Maharashtra		27	
	Gujarat		16	

There would be regulated releases from Narmada Sagar Project (NSP) about 300 km. upstream in Madhya Pradesh.

It was also decided that the Main Canal is to be extended upto the Rajasthan border for irrigation to the drought prone areas of 75,000 ha. in Barmer and Jhallore district of Rajasthan.

According to the Award of NWDT, the parameters of Sardar Sarovar dam will neither be reviewed nor changed till 2025 A.D. i.e. 45 years after the notification of the Award. The award is binding on all the concerned parties.

Quality Control at Sardar Sarovar Project

Sardar Sarovar Project (SSP) is a multipurpose river valley project currently under construction across the river Narmada to irrigate 17.92 lakh hectare annually in the State of Gujarat. The main dam and hydropower works are under progress. The construction work of various canals of SSP, Gujarat State is in full swing. The Narmada Main Canal (NMC) of the SSP is the largest irrigation lined canal in the world. The total length of NMC is 458 km. having a capacity of 1133 cumecs (40,000 cusecs) at head and 71 cumecs (2500 cusecs) at tail. The NMC and its branch canals in Phase- I (ch. 0 to 144.5 km.) are completed whereas works of distribution system are nearing completion. The NMC works in Phase-II A (Ch. 144.5 km. to 264 km.) are also almost completed and its branches are under progress. The NMC works in Phase- II B (i.e. Ch. 264 km to 357 km) are in progress and planned to be completed by September, 2003 and its branch canals are under progress. The work of Saurashtra Branch Canal (total length 104 km.) and its branches are under progress and the work of Kutch Branch Canal (total length 307 km.) are to be taken up shortly. Thus, large quantum of canal works are to be taken up shortly by SSP.

Benefits from Sardar Sarovar Project

Irrigation

Drinking Water Supply

Hydro Power

Flood Protection

Irrigation

The Sardar Sarovar Project will provide irrigation facilities to 18.45 lac ha. of land, covering 3112 villages of 73 talukas in 15 districts of Gujarat. It will also irrigate 75,000 ha. of land in the strategic desert districts of Barmer and Jalore in Rajasthan and 37,500 ha. in the tribal hilly tract of Maharashtra through lift. About 75% of the command area in Gujarat is drought prone while entire command (75,000 ha.) in Rajasthan is drought prone. Assured water supply will soon make this area drought proof.



Drinking Water Supply

A special allocation of 0.86 MAF of water has been made to provide drinking water to 135 urban centres and 8215 villages (45% of total 18144 villages of Gujarat) within and out-side command in Gujarat for present population of 18 million and prospective population of over 40 million by the year 2021. All the villages and urban centres of arid region of Saurashtra and Kachchh and all "no source" villages and the villages affected by salinity and fluoride in North Gujarat will be benefited. Water supply requirement of several industries will also be met from the project giving a boost to all-round production

Hydro Power

There will be two power houses viz. River bed power house and canal head power house with an installed capacity of 1200 MW and 250 MW respectively. The power would be shared by three states - Madhya Pradesh - 57%, Maharashtra - 27% and Gujarat 16%. This will provide a useful paking power to western grid of the country which has very limited hydel power production at present.

A series of micro hydro power stations are also planned on the branch canals where convenient falls are available.

Flood Protection

It will also provide flood protection to riverine reaches measuring 30,000 ha. Covering 210 villages and Bharuch city and a population of 4.0 lac in Gujarat.

Conclusion

During visit to Sardar Sarovar Project, initially the entire basin map of Narmada valley was studied. For the construction of Sardar Sarovar dam the huge batching plant of 330 cu.m. per hour has been installed and 28 tonne capacity cable was is being operated for sake of construction of dam. This really added advanced technical background regarding construction of dam. Narmada main canal, we are fortunate to visit various canal structures like, Chute spillway which is very unique in canal network. We also visited and studied the Rock fill dam in the vicinity of Sardar Sarovar Project.



GROUP PHOTO OF AT VISIT OF SARDAR SAROVAR DAM



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THANK YOU