



REPORT OF THE IRRIGATION AND POWER TEAM
ON
NAGARJUNASAGAR PROJECT
(ANDHRA PRADESH)

COMMITTEE ON PLAN PROJECTS
NEW DELHI
JULY 1960

LETTER OF TRANSMITTAL

No. COPP/I&P/7/59

COMMITTEE ON PLAN PROJECTS YOJANA BHAVAN

Parliament Street
NEW DELHI.

23rd July, 1960.

Dear Shri Pantjina

I have pleasure in forwarding to you the Report of the Irrigation & Power Team on the Nagarjunasagar Project. The study of the Project was initiated under the able Leadership of my predecessor, Shri N. V. Gadgil, who relinquished the Leadership on 26th September, 1959.

2. The Team prepared their preliminary Draft Report after visiting the Project site a number of times and discussing in detail the various issues with the Project Authorities. The same was forwarded to the Government of Andhra Pradesh on 2nd February and discussed with them on 25th and 26th March, 1960. The Report has been finalised in the light of decisions arrived at at that meeting.

3. Among the recommendations made by the Team, the following are the more important—

Build the Dam to its final height in the first phase with sill of spillway gates lowered to R.L. 546 and defer installation of the spillway gates to the final phase.

This will enable storage of water to F.R.L. 546 and thereby ensure an annual irrigation of 18 lakh acres of first crop and 1.25 lakh acres of second crop as against an annual irrigation of not more than two-thirds of 18 lakhs of first crop and no second crop, which is all that can be secured by building the Dam to F.R.L. 525 as proposed in the project for the first phase.

The additional expenditure involved will be Rs. 2.5 crores.

(ii) Increase, in the interest of safety, the spillway capacity by adding three bays to the 24 bays of 50 feet

each, making 27 bays in all and lower the sill of all the gates from R.L. 550 to R.L. 546, so that the gates will now be 44 feet instead of 40 feet in height.

If the results of certain suggested studies indicate the necessity for further increase in spillway capacity, this should be secured in the form of a saddle spillway on the left bank.

- (iii) Provide for developing in the first phase 100 M.W. of power.

The additional expenditure involved will be Rs. 4 crores and the additional revenue earned each year will be Rs. 70 lakhs, which will improve the financial return of the project.

- (iv) Lower the full supply level of the Left Bank Canal by 10 feet (by suitably widening the intake channel in the first phase and making provision for constructing a second tunnel in the second phase), thus enabling the reservoir storage between R.L. 520 and R.L. 510 to be utilised, thereby increasing the second crop irrigation by 42,000 acres per annum on the average.

- (v) Accept the proposal of the Project Authorities to design the Left Bank Canal for an ultimate (final stage) discharge of 15,000 cusecs and construct during the first phase all masonry works for this discharge of 15,000 cusecs but build the canal only for the first phase discharge of 11,000 cusecs.

This will provide additional annual irrigation of 3.5 lakhs below the point where the canal proposed for 11,000 cusecs will end. This additional irrigation will be feasible on the basis of 75 per cent dependability.

- (vi) Provide water for early sowing of cotton and for the irrigation of upper lands adjoining the distributaries (which under the project have been excluded) in addition and in preference to the lower valley lands and irrigate these later by lift of the sub-soil water thus eliminating the possibility of water-logging.
- (vii) Plan all projects on the Krishna on the basis of 75 per cent dependability.

- (viii) Integrate operation of Nagarjunasagar Reservoir with the Srisaïlam Reservoir when constructed. This will result in an increase in annual irrigation of 3 lakhs of acres of second crop and power generation at Srisaïlam from 260 M.W. to 377 M.W. at 60 per cent load factor.
- (ix) Arrange early adjustment in the 1951 Award on the allocation of Krishna waters consequent on the re-organisation of States which has taken place since.
- (x) Prepare without delay a revised detailed project estimate incorporating all changes introduced by the Project Authorities to-date and those suggested by the Team.

4. I take this opportunity of thanking you for the constant interest you have taken in the Team's study and the guidance you have given me from time to time. I would also place on record the help and guidance which the Members of the Consultative Committee have given to the Team throughout.

Yours sincerely,
A. N. KHOSLA.

Shri Govind Ballabh Pant,
Home Minister,
Government of India,
NEW DELHI.

CONTENTS

CHAPTER	SUBJECT	PAGES
	Preface	(i) to (iii)
I.	Scope of the Project	1—3
II.	Availability of Water	4—6
III.	Feasibility of First Phase Project	7—18
IV.	Integration of Srisaillam and Nagarjunasagar Projects	19—46
V.	Design Features	47—54
VI.	Construction Features	55—72
VII.	Phasing of Construction Programme	73—74
VIII.	Power Development	75—78
XI.	Construction Costs	79—90
X.	Irrigation Development and Agricultural Aspects	91—99
XI.	Summary	100—113
	Appendices	114—197

*Statement showing observations and recommendations of the Irrigation and Power Team along with comments of the Government of Andhra Pradesh.

MAPS AND CHARTS

Sl. No.	SUBJECT	FACING PAGE No.
1.	Index Map of Nagarjunasagar Project	2
2.	Graph of Contents of Nagarjunasagar Reservoir	16
3.	Hydro-Power Development in Krishna Basin	22
4.	Graph of Contents of Srisaïlam Reservoir	26
5.	Surface Levels of Head Reach of Left Bank Canal	52
6.	One of the proposed Ayacut Plans of Matsavaram Distributary	94

PREFACE

The Committee on Plan Projects set up by the National Development Council decided in May, 1958 that Koyna and Nagarjunasagar multi-purpose Projects should be studied in accordance with the Terms of Reference, with a view to securing economy and efficiency in the utilization of financial and other scarce resources. The Team for Nagarjunasagar Project consisted of :—

Shri N. V. Gadgil	Leader
Shri Balwant Singh Nag, formerly Member, High Level Committee on Floods, C.W. & P.C.	} Members
Shri M. P. Mathrani, Chief Engineer (Retd.), Bihar.	
* Shri Lal Singh Director of Agriculture (Retd.), Punjab.	

Shri N. V. Gadgil relinquished the Leadership of the Team towards the end of September, 1959. Later Dr. A. N. Khosla joined as Leader of the Team.

The Team was assisted by a Consultative Committee, consisting of the following eminent Engineers :

Dr. A. N. Khosla,
Vice-Chancellor, Roorkee University.

Shri N. N. Iyengar,
Electrical Adviser,
Hindustan Steel (P) Ltd.

Shri M. S. Thirumale Iengar,
Chief Engineer, Hirakud.

Shri A. C. Mitra,
Chief Engineer, Irrigation & Rihand Project (U.P.).

** Shri S. D. Khungar,
formerly General Manager,
Bhakra Dam Project.

Shri D. S. Borker, Secretary to the Consultative Committee also worked as Secretary to the Irrigation & Power Team.

*Appointed in September, 1958, as additional Member to study agricultural aspects.

**Joined in November, 1959.

The Terms of Reference which were communicated by the COPP in their Memorandum No. COPP/4(14)/58, dated the 13th May, 1958 required that the Team should make a study of the various aspects of the two Projects and of the following ones in particular :

- (1) The aspects of the Project having a bearing on economy and efficiency with special reference to :
 - (a) Utilisation of trained personnel and materials;
 - (b) Utilisation of machinery and equipment;
 - (c) Construction Plan lay-out;
 - (d) Adequacy of original estimates and designs as evidenced from actual construction of the Project;
 - (e) Phasing of construction with a view to studying whether :
 - (i) timely utilisation of benefits accruing from the Project has been ensured;
 - (ii) it is possible to accelerate accrual of benefits; and
 - (iii) benefits could be increased by rephasing the Project at this stage;
 - (f) Sufficiency of investigations conducted at the Planning stage with a view to the formulation of project estimates; and
 - (g) The effect of the above study on the financial results of the Project, if any.
- (2) Generally to assess the progress made in construction, the reasons for shortfall, if any, and to suggest measures for improvements in the future;
- (3) To examine the possibility of decreasing dependence upon imported materials and equipment required for the Project;
- (4) To examine whether adequate steps have been taken by the authorities concerned for fixing and realising the contemplated water rates, betterment fees and/or any other rates, cesses or taxes; and
- (5) To report on any other aspect that the Team may like, in order to ensure economy and efficiency in the construction of the Project.

The Members of the Team paid a number of visits to the Nagarjunasagar Project and had detailed discussions with the Chief Engineers for Canals and Dam and other officials connected with the Project. The Leader, along with the Members of the Consultative Committee, visited the Project site from 24th to 26th October, 1958. Team gave its interim recommendations on the 9th November, 1959 which were discussed by the Consultative Committee at the meeting held at Roorkee on the same day. Extracts of the Team's recommendations calling for immediate modifications in the design of spillway and Left Bank Canals were forwarded on the 8th January, 1960 by the Leader to the Central Water and Power Commission and the Government of Andhra Pradesh, to enable them to take timely action. The Team discussed in detail the Draft Report at the Consultative Committee Meeting held on 18th January, 1960 and necessary modifications were made therein. A copy of the Draft Report was forwarded to the Government of Andhra Pradesh and was subsequently discussed with them on 25th and 26th March, 1960. A copy of the Draft Report as finalised in light of decisions taken at that meeting was forwarded to the Chairman, Central Water and Power Commission for remarks. The Team is glad to note that the Central Water and Power Commission are in general agreement with its recommendations.

The Team would like to place on record their gratitude to the Government of Andhra Pradesh for the facilities extended for the conduct of investigations and the spirit of accommodation shown by the Chief Engineers, Sarvashri M. Jaffer Ali and G.A. Narasimha Rao and other concerned officials.