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GOVERNMENT OF MAHARASHTRA

**MEMORANDUM**  
**ON**  
**ALLOCATION OF**  
**KRISHNA-GODAVARI WATERS**



BOMBAY

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**Background of the 1951 Conference**

1. The Planning Commission thought of holding an inter-State conference of the State Governments of Bombay, Hyderabad, Madras and Mysore to discuss the irrigation and power schemes in the Krishna and Godavari valleys for inclusion in the second part of the First Five-Year Plan in May 1951. Accordingly in his D. O. No. PC/11716/51, dated 7th May 1951, addressed to the Hon'ble Dr. Jivraj Mehta, Minister, P. W. D., Bombay, Shri V. T. Krishnamachari, Member (Natural Resources), Planning Commission, stated as under :—

“The State Governments of Bombay, Hyderabad and Madras have important schemes for irrigation and/or electrification based on the river Krishna and/or its tributaries, such as the Koyna Project (Bombay), Krishna-Pennar Project (Madras). On these, formal consultations between the Governments concerned have taken place in some cases but not in all.

*In order to decide on the inclusion of such schemes in the plan under preparation by the Planning Commission,*

it has been suggested that a Conference might be convened by the Planning Commission at which such schemes might be discussed among the States concerned so that early decisions may be taken on what schemes should be included.”

In the same D. O. letter the following information was called for by the Planning Commission :—

- (a) the projects which the Bombay Government had in view for utilising supplies in the Krishna river system (including tributaries) for irrigation and power,
- (b) the quantum of proposed utilisation,
- (c) the supplies then available at the proposed sites of withdrawals,
- (d) the quantum of withdrawals by works already under construction or operation, and
- (e) the financial aspects of the projects and other details.

Similar information was called for from other Governments by the Planning Commission and the Central Water and Power Commission. The following is an extract of the Government of Madras (P. W. D.) letter No. 4459 J/48-24 dated 2nd July 1951 addressed to the Chairman, Central Water and Power Commission, New Delhi :—

“With reference to your letter cited, I am directed to state that any attempt to collect elaborate data as suggested will require examination of several features and a prolonged investigation. The present staff position

of this Government is exceedingly acute and the available staff are required for schemes which would yield quick results in food production and cannot be spared for collection of the elaborate data suggested.

“ I am to add that it does not seem really necessary to collect elaborate data as suggested by the Central Water Irrigation and Navigation Commission and decide on the final allocation of all waters available in the Krishna system as in view of financial conditions and the world situation generally, it is hardly likely that the States will be in a position for some years to investigate in detail and execute all schemes which would utilise in full the water resources falling to their share. The Madras Government are inclined to the view that all that is needed is a discussion to clarify the position in regard to the Bombay scheme and ensure that it would not prejudicially affect the existing rights of Madras and Hyderabad and also their proposed new schemes. For the present it would, therefore, be sufficient to consider only concrete schemes for *partial utilisation* of the waters of Krishna and its tributaries, the question of final allocation of all available waters of the Krishna Valley being left to be settled later.

“ This Government also understand that the Planning Commission proposes to discuss what concrete schemes on the Krishna and the Godavari and their tributaries should be included in the Plan for the present.”

From the foregoing extracts it will be obvious that the intention of holding the inter-State Conference in July 1951 was to consider projects in Krishna and Godavari valleys for inclusion in the second part of the First Five-Year Plan and perhaps in the earlier part of the Second Five-Year Plan.

This fact is further confirmed in his opening remarks at the inter-State Conference by Shri V. T. Krishnamachari. An extract from the summary record of discussions at the inter-State Conference held on 27th and 28th July 1951 is reproduced below :—

“ Opening the discussion Shri V. T. Krishnamachari stated the broad principles on which schemes for irrigation and power development should be selected for inclusion in the Plan. He mentioned that only projects, which had been thoroughly investigated and found technically, economically and financially justifiable, should be included in our Five-Year Plan.

“ The object of the conference was to discuss the utilisation of supplies in the Krishna and Godavari river basins so that an assessment could be made of the relative merits of projects proposed for inclusion in the second part of the Five-Year Plan. He referred to the technical paper already circulated showing the supplies available in these rivers. In considering the issues placed before the meeting, two points of view should be reconciled. The first was the need from an all India point of view for increasing available food supplies within the shortest possible time and on the most economic basis. The irrigation Commission reporting over 50 years ago emphasised the need regarding irrigation development as a national-all-India question. This was even more important now than it was in the past. India's food problem can be solved only on such a basis. The shortage of power in the Bombay

City and surrounding areas should also be regarded as an urgent problem! On the other hand, regional development was important, especially the development of backward regions, and could not be ignored. He was confident that an agreement could be reached reconciling these two considerations in a practical manner which would be equitable to all areas concerned."

From the foregoing details it will be seen that the details supplied for consideration at the 1951 Conference were not intended for consideration of final allocation of water resources of the Krishna and Godavari valleys. The States were required to indicate only such projects as were reasonably investigated in detail at that time and state the appropriate utilisation of water resources on those projects for their consideration for inclusion in the second part of the First Five-Year Plan. The Madras Government had rightly stated in their letter dated 2nd July 1951 referred to above that—

"For the present it would, therefore, be sufficient to consider only concrete scheme for *partial* utilisation of the waters of the Krishna and its tributaries, the question of final allocation of all available waters of the Krishna valley being left to be settled later."

In this context, interpreting the inquiry as related to schemes for *immediate* inclusion in the Five-Year Plan, the Bombay Government submitted a list of works which were then reasonably investigated. The list so submitted was far from full, a number of projects having been excluded by Government from the list, proposed by the Chief Engineer, for the specific reason that they had not been adequately investigated, although they might be in contemplation for investigation and execution in later years.

#### **Demands of States at the 1951 Conference**

2. Against an available flow of 970 T. M.C. the Madras Government made a demand of 950 T.M.C. for three projects, i.e. almost the whole of the balance available for future works in the entire valley in the Bombay, Mysore, Hyderabad and the Madras States, while the erstwhile Hyderabad State demanded 585 T.M.C. for five projects in that State.

It was comparatively easy for the lower States of Hyderabad and Madras to prepare projects utilising a very large quantum of water on half a dozen schemes because the topography happens to be favourable.

In the lower reaches of the Krishna river, where the river flows through flatter country and the basin is a vast expanse, it is possible to devise a few gigantic schemes, wherein either by weirs or storage dams, large quantities of water could be made available for irrigating correspondingly large areas. In the Deccan Maharashtra, however, the country is much cut up, the river basins of the Krishna and its tributaries are narrow and consequently irrigation has to be thought of in terms of a large number of relatively smaller schemes, principally with provision of storage in dams. The irrigable commands are as a rule narrow strips along the river course.

Under the British administration little systematic interest was taken in the development of the Water resources in the Bombay State, apart from the construction of a few irrigation schemes, devised purely as famine protection works. In the planning of comprehensive water

utilisation, therefore, the Bombay State had to start from scratch after attainment of Independence. Also in the initial years after Independence the Government of Bombay had given priority to irrigation works in Gujarat region where major irrigation schemes were non-existent. In these circumstances, the Bombay State was at a great disadvantage during the 1951 Conference in presenting a sufficient number of fully investigated projects to match up to a utilisation of the waters of the River proportionate either to its needs or to its fair share of these waters. Consequently for the Krishna river waters apart from the Koyna Project, Bombay's demand, being understood as limited to ready schemes, was confined to a few small projects which had been investigated by Beale as far back as in 1906, the total demand against which came to the small figure of about 110 T.M.C. only, for projects in Maharashtra.

### The demands and the allocations

3. At the inter-State Conference, the existing utilisation (as in 1951) and the requirements of projects already sanctioned and taken up for construction as intimated by the participating States was seen to be as under :—

#### Existing utilisation—

Bombay	.. All minor works	..	120 T.M.C.
Hyderabad	.. All minor works	..	90 T.M.C.
Mysore ..	.. Vanivilas Sagar	..	30 T.M.C.
Madras ..	.. Kurnool Cuddappah Canal	..	10 T.M.C.
Delta Irrigation	Ex-Vijayawada Weir	..	200 T.M.C.
Total			.. 450 T.M.C.

#### Projects under construction—

Bombay ..	Ghataprabha Left Bank Canal	15.0 T.M.C.	
	Kolchi weir	.. 8.0 T.M.C.	
	Radhanagari Project	.. 11.3 T.M.C.	
	Miscellaneous	.. 21.7 T.M.C.	
Total		.. 56.0 T.M.C.	56.0 T.M.C.
Hyderabad ..	Tungabhadra project	.. 65 T.M.C.	
	Rajolibandi	.. 17 T.M.C.	
	Minor works	.. 8 T.M.C.	
Total		.. 90 T.M.C.	.. 90.0 T.M.C.
Mysore ..	Bhadra reservoir	.. 57.0 T.M.C.	
	Tunga anicut	.. 11.5 T.M.C.	
Total		.. 68.5 T.M.C.	.. 68.5 T.M.C.
Madras ..	Tungabhadra Project	.. 65 T.M.C.	.. 65.0 T.M.C.
Grand Total			..279.5 T.M.C.
Say			..280 T.M.C.



As the demand was nearly twice the available supply it was proposed to scale down the demands by allocating the following shares to the States concerned :—

Bombay	..	..	..	..	20 per cent.
Hyderabad	..	..	..	..	30 per cent.
Mysore	..	..	..	..	1 per cent. (provisional)
Madras	..	..	..	..	49 per cent.

It was pleaded by the Union Minister for Works, Mines and Power, Shri Gadgil, that such a distribution would not be equitable as it would prejudice the development of the economically backward areas in the Bombay State and after some discussion Bombay's share was increased by 4 per cent. Hyderabad and Madras having surrendered 2 per cent. each.

The final allocation stood as under :—

Bombay	..	..	..	24 per cent.	=	240 T.M.C.
Hyderabad	..	..	..	28 per cent.	=	280 T.M.C.
Mysore	..	..	..	1 per cent.	=	10 T.M.C.
Madras	..	..	..	47 per cent.	=	470 T.M.C.

The flow in excess of 1,000 T.M.C. (in good years) was allocated as under :—

Bombay	...	..	30 per cent.
Hyderabad	..	..	30 per cent.
Mysore	..	..	1 per cent.
Madras	..	..	39 per cent.

It was stipulated that the above allocations were subject to the condition that the diversion of supplies across the western ghats will be limited to 67.5 T.M.C.

Thus while the Conference started with the object of considering a few irrigation projects for increasing food supplies in the shortest possible time and the power project to meet the pressing needs of Bombay, it ended with a final division of the Krishna waters. The allocations were made *pro rata* to what was demanded for specific projects at that particular juncture and there is no record of any consideration being given to any of the long-term criteria relevant for such a final allocation of waters e.g. needs of different areas, proportions of basin areas, yield of water from different areas etc.

While the States of Madras and Hyderabad, due to their topography, were in a position to advance as fully investigated schemes a very few gigantic projects, and thus stake out to appropriate the entire remainder of the Krishna waters the Bombay Government was not in a position to ask for the Deccan Maharashtra more than a very small proportion of this available balance due to the nature of topography in the upper reaches of the River. In fact it is only very recently after the creation of a special organisation for investigating the water resources within the State, that the full possibilities of optimum utilisation of the Krishna waters in the Deccan Maharashtra have been assessed. The Krishna basin in the Bombay State contains very large areas suffering



from chronic famine and scarcity conditions. For instance the area in the Bhima basin, a tributary of the Krishna, and comprising a major sub-basin in Maharashtra region for instance is almost wholly affected by famine conditions. The bulk of the area in the remainder of the Krishna basin in Maharashtra gets a rainfall of less than 25 inches. The division of water as made by the 1951 Agreement bears no relation to the areas in the Krishna basin within the respective States. Also while a narrow restriction was put on diversion of water for the Koyna Hydro electric project (in spite of the exceptionally favourable features of this Hydro-electrical scheme with a head of approximately 1,500 feet, an ideal dam site and the enormous run-off of a highly dependable rainfall in a small catchment), no such restriction was placed in other States on diversion of Krishna waters to areas outside the Krishna basin without fully meeting first the requirements within the basin itself. The Madras Government's Krishna-Pennar scheme appears to have envisaged a large diversion outside the Krishna basin. Exact particulars of this cannot be given as neither at the conference nor at any time thereafter have the specific particulars of the original Krishna-Pennar scheme been made known. In any case it would appear that this diversion could not be less than 300 T.M.C. outside of the Krishna basin which is envisaged in the joint report by Andhra and Hyderabad States for the Nandikonda Project in 1954, which came to replace the Krishna-Pennar Project.

#### Allocation not relatable to any equitable principle

4. That the distribution took no count of the relative proportion of the areas of the Krishna basin in the different regions would be seen from the following figures :—

State.	Basin area (square miles).	Percentage area.	Allocation T. M. C.	Percentage of total allocation.
Bombay .. ..	38,000	39.2	416	23.85
Mysore .. ..	11,100	11.4	108.5	6.24
Hyderabad .. ..	35,450	36.5	460	28.37
Madras .. ..	12,500	12.9	760	43.54

The contrast as between Bombay and Madras is striking. Bombay gets an allocation of 23.85 per cent. as against an area of 39.2 per cent. while Madras gets an allocation of 43.54 per cent. as against her area of 12.9 per cent. Even the allocation of the undependable surplus in excess of the 1,000 T.M.C. of dependable flow was not distributed equitably, Madras getting 39 per cent. against her area of 12.9 per cent.

Nor was any consideration given to the water contribution of the different States. The water contribution by the Krishna basin area included in the post-1956 Bombay State (and now in the State of Maharashtra)—i.e. excluding

the Krishna basin area that went to Mysore in November 1956—is itself computed at nearly 50 per cent. of the total waters of the river. Thus the 'water contribution' was itself far in excess of the 'area proportion' and since even the 'area proportion' was not matched by the allocation made, *a fortiori*, the 'water contribution' was also wholly ignored.

Nor was any consideration given to the large proportion of the Krishna basin area in Maharashtra which was subject to recurrent scarcity and famine.

The areas in the 25" isohyets and below in the Krishna basin in the various States bear the following proportions to the gross areas :—

*Statewise Proportions of Scarcity Areas in the Krishna Basin.*

Serial No.	Name of the State.	Gross areas of the States in Krishna Basin upto Bezwada Anicut sq. miles.	Area of the States below 25" isohyets in Krishna basin sq. miles.	Percentage of Col. (4) to the total of Col. (4)	Percentage Col. of (4) to Col. (3).	Percentage of Col. (4) to total of Col. (3).
1	2	3	4	5	6	7
1	Maharashtra ..	26,212	13,380	28	50.9	13.7
2	Mysore ..	44,640	27,596	57.8	61.8	28.3
3	Andhra ..	26,536	6,708	14.2	25.3	6.88
	Total ..	97,388	47,684	100		48.88

The largest beneficiary of the allocation, was the Krishna-Pennar Project in Madras. The Krishna basin areas under command of this Project have an annual rainfall of over 35 inches against the scarcity areas of Maharashtra and Mysore with rainfall under 25 inches and in some regions even less.

How the original avowed purpose of the conference was wholly miscarried by the resultant allocations is well illustrated by a consideration of the Krishna-Pennar Project, by far the largest beneficiary of the allocation.

Out of 950 T.M.C. demanded by Madras, 825 T.M.C. were shown against the Krishna-Pennar Project which provided for the construction of a large dam across the Krishna at Sidheshwar with a 300 mile long canal carrying the enormous discharge of 75,000 cusecs. This canal was to discharge into a reservoir formed by the construction of a dam across the Pennar River (outside the Krishna basin) and a canal system dependant on this storage was to irrigate large areas in Madras. Thus by its very nature and enormous size, Krishna-Pennar Project was essentially a long-term project and could scarcely

be said to merit inclusion in the list of projects to be taken up immediately for meeting the emergent food situation. As a matter of fact, the Nagarjunsagar Project (which after investigation by a Government of India Committee replaced, with large modifications, the original Krishna-Pennar Project) actually commenced some five years later and is not expected to be completed before at least the end of Plan III i.e. 15 years after the 1951 conference in which this large appropriation of water was awarded to it, purporting to be an allocation against an emergent need.

### Irrigation in Maharashtra : present and prospective ; and requirements of water for hydropower

5. As it is, the irrigation facilities in Maharashtra are among the lowest in India, Table "K" below shows the percentage of total irrigated area from all sources to total cropped area in some of the States in the Indian Union :—

TABLE "K".

*Gross Area Irrigated during 1956-57 in some States.*

(Figures in thousand Acres).

State.	Total area irrigated (under all crops).	Total gross cropped area.	Percentage of area irrigated.
1. Maharashtra .. .. .	2,602	46,382	5.6
2. Gujarat .. .. .	1,487	23,979	6.2
3. Andhra Pradesh .. .. .	8,371	30,750	27.2
4. Assam (excl. N. E. F. A.) .. .. .	533	6,003	25.2
5. Bihar .. .. .	4,384	25,005	17.5
6. Jammu and Kashmir .. .. .	776	1,906	40.7
7. Kerala .. .. .	1,110	5,465	20.3
8. Madras .. .. .	7,228	17,145	42.2
9. Orissa .. .. .	2,820	14,958	16.9
10. Punjab .. .. .	9,143	23,786	38.4
11. Rajasthan .. .. .	4,183	33,881	12.3
12. Uttar Pradesh .. .. .	12,467	52,766	23.6
13. West Bengal .. .. .	3,077	14,977	20.5
Total All India .. .. .	.....	.....	17.2

Sources.—(1) Agricultural situation in India, September 1959.

(2) Handbook of Basic Statistics of Maharashtra State, 1960.

(3) Handbook of Basic Statistics of Gujarat State, 1960.

It has been roughly assessed that even with an optimum utilisation of the water resources within the Krishna basin, it will hardly be possible to irrigate more than 15 per cent. of the total culturable area under all sources of irrigation in the Deccan Maharashtra. Within the allocation awarded to this State by the 1951 Conference this figure will be reduced very considerably to a still smaller percentage. About 28 per cent. of the total area in Krishna basin affected by scarcities and famines lies in Maharashtra State (areas below 25" isohyets). Irrigation for even a seasonal dry crop is, therefore, eagerly welcomed by farmers in Maharashtra and even this they will not be able to get. In the lower States not only very large areas have been provided with irrigation to wet crops but substantial areas have been provided with irrigation to second crops. In Andhra Pradesh alone over 14 lakh acres of wet crops were irrigated as a second and third crop *vide* Table "M" in Appendix I. In the Nagarjunsagar project, not only a provision for 2.7 lakh acres under second crop is made but it is proposed to irrigate nearly 2 lakhs of acres under forest and pasture.

A map of the Krishna basin areas in the State of Maharashtra is appended showing therein the scarcity affected areas (based on the report of the Scarcity Areas Committee of the Government of Bombay), the areas out of these at present enjoying the benefit of irrigation and the areas that could at all be so served in the future on the basis of the comprehensive water utilisation planning recently made by the Public Works Department of the Government of Bombay.

It appears that the diversion to the West was limited to 67.5 T.M.C. because according to the load forecast then available, a load of 359 M.W. was expected to develop in the 10th year of operation of the Koyna project, i.e. by 1971. To generate this power a diversion of 67.5 T.M.C. was needed. According to recent forecasts the demands are far in excess of the original forecast as may be seen from the figures adopted by the World Bank Experts and the Committee on Plan Projects :

		1961.	1966.	1970.
World Bank	..	520	750	890
COPP	..	470	727	....

The circumstances under which the diversion appears to have been limited to 67.5 T.M.C. have thus totally changed and even on the basis on which the diversion was thus limited, the question warrants reconsideration.

The narrow restriction on the diversion of Krishna waters towards West for generation of cheap hydro-electric power would seem both if advised from the national view point of balanced exploitation of available power resources as well as a very great hardship on Maharashtra. The Western part of Maharashtra containing highly industrialized cities of Bombay, Poona, Sholapur etc. is far remote from coal fields and generation of thermal power is very costly, and involves long haulage of coal. Cheap power for industrial development is an absolute necessity especially as the potentiality for irrigated farming is severely limited and there are little or no mineral possibilities in

the Deccan Maharashtra. When such severe limitations to the employment potential of the region are operative already it would seem harsh indeed to limit the exploitation of almost the only favourable geographical feature of the terrain, namely hydro-electrical possibilities due to the high head available and the abundant rainfall. Without cheap power, the development of industries will not get impetus. It is not seen why it should be considered objectionable to permit Bombay to carry out modest diversions within her own rightful share, of the Krishna waters on the basis of an equitable allocation, when much larger diversions outside the Valley out of a disproportionately large allocation are authorized down-stream of the river.

**Reorganisation of States : necessity now not only of re-adjusting the allocations but also of completely reviewing them**

6. In place of the States of 1951 we have now the States of Andhra, Mysore and Maharashtra.

Purporting to consider only a readjustment of the 1951 allocations, a note suggesting the basis for the revision of allocations was circulated by the Central Water and Power Commission to the States concerned in February 1959 for their comments.

By this time the Water Resources Circle of the Bombay P. W. D. had practically completed the preparation of the Master Plan for the Bhima Valley in the Krishna basin and studies in respect of the remaining part of the Krishna Valley had made a fair progress. These studies showed that the requirement for new projects in Maharashtra State, including those which were started after 1951 was 538.83 T. M. C.

As against this, Bombay's share, after deducting the allocation of 61 T. M. C. for Ghataprabha, Asoga and other projects, transferred to Mysore, comes to 179 T. M. C. only (*Note*: Out of this Mysore is claiming 46 T. M. C. as a share of Koyna, which Bombay has not admitted). After allowing for utilisation on the projects taken up during the Second Plan such as Koyna, Khadakvasla, Vir, Ghod, etc. the balance left for future work is a meagre 56 T. M. C. Against this the Plan III study group on irrigation in Bombay has proposed Schemes designed to utilize 140 T. M. C. Under this allocation therefore barely a third of the Schemes prepared for the III Plan by the Maharashtra State can be accommodated let alone the further Schemes for subsequent Plan periods. In effect if the allocation stands, it would mean that Deccan Maharashtra must soon give up further irrigation projects altogether. Such a manifestly inequitable and unjust situation could only be redressed by undertaking a fresh revision of the Krishna waters. Accordingly a D. O. letter was addressed by Secretary, P. W. D. to the Secretary to the Government of India, Ministry of Irrigation and Power, communicating Bombay Government's desire to review the issue (Appendix II). A preliminary note prepared by the Water Resources Investigation Circle on the revised allocation of Krishna waters arising out of the reorganisation of States was also forwarded to the Central Water and Power Commission on 3rd August 1959. In these communications it was stressed that the allocation made in 1951 was done on an *ad hoc* basis, without following any principles

of equity such as (a) the gross and culturable areas of the States in the Krishna basin, (b) needs of famine and scarcity affected areas deserving priority and (c) water resources contributed by the States. It was also pointed out in the note that actually more water was available in the Krishna basin than what was assumed due to the following reasons :—

(i) Due to adoption of a wrong co-efficient of discharge at the Vijayawada Weir, as already pointed out by the Chief Engineer, Madras at the 1951 Conference.

(ii) Due to the fact that additional quantity of water would be made available due to the regeneration of water from irrigated areas.

It has already been pointed out in the foregoing how a review is called for on merits due to the many defects of the 1951 allocations.

Apart from this there is a case for review on other grounds as well. Of the original four States participating in the 1951 conference, one, namely Hyderabad, has entirely disappeared; Madras has no longer any direct interest as it is outside the Krishna basin; two entirely new States, namely Andhra and Maharashtra, have since come into existence; and the interest of the State of Mysore, only peripheral in 1951, has greatly increased since due to large accretions of Krishna basin territory in the reorganisation of 1956. The parties are, therefore, almost entirely new now as compared to 1951.

It may also be pointed out that the Mysore Government has not to this date ratified the agreement. Obviously an agreement purporting to allocate a percentage share of waters cannot be treated as effective if any of the parties does not ratify it.

So far as the Godavary waters are concerned the Orissa State, it appears, was altogether left out in the previous proceedings as well as the allocations resulting therefrom. It is now proposed by the Central Water and Power Commission to allocate to that State 30 T. M. C. of the Godavary waters and reduce the percentages of all others to accommodate this.

One would have assumed that in a proceeding in which on the basis of project demands the allocation of waters between different regions was sought to be determined for 25 years (that is to say virtually *for all time to come*, since once the projects are executed the assignments of the water to the projects would exhaust all available supplies) care would have been taken to verify at any rate, the essential particulars of the projects, especially their water-planning. There is nothing to show that this was done and indeed all the evidence indicates to the contrary. Most of the schemes advanced for appropriation of waters had not been previously cleared with the Central Water and Power Commission even as regards water-planning; nor indeed was information made available to each State regarding the projects for which demands were advanced by the other States. It would appear that the very feasibility of some of the projects, in both the Krishna and Godavary basins, in the shape in which the projects were advanced, was open to serious question and indeed was questioned in the course of the conference proceedings. In spite of these questionings the demands advanced for these States were

adopted as the datum for allocations. The many alterations that have already taken place in fact in respect of the water-planning of some of the projects advanced are themselves a witness to the unreliability of the demand for water appropriation advanced on behalf of the different projects at the conference.

It may conceivably be argued that the formula for the allocation of the so-called "surplus" adopted in the 1951 allocations would take care of the errors in computation of availability of water. Any such argument would however be fallacious and untenable. When all available waters of an accepted dependability are assigned away by allocation to different regions, "surplus" can only mean water resources of less than the dependability assumed. A formula for the distribution of such surplus resources can have no relevance for additional quantities of water found to be available as a result of correcting original errors in computation, inaccuracies in allowing for existent utilisation, larger availability due to the factor of regeneration noted but previously ignored, and due to adoption of the standard dependability namely 75 per cent. against the dependability of 86 per cent. arbitrarily assumed in the previous allocations. All these errors in the computation *basically* vitiate the allocation itself and cannot be rectified by resort to the formula regarding "surplus" as "surplus" is altogether a different concept from such larger availability of water resources.

Altogether, in the opinion of the Government of Maharashtra, the case for a "review" as distinct from merely a "readjustment" as per areas in the new reorganised State units, is irresistible.

We have, therefore, not offered in this memorandum any comments of detail regarding the calculations suggested by the C. W. & P. C. for a "readjustment" of these allocations amongst the new State units.

#### **A re-assessment of available water necessary**

7. A certain run-off series based on the gauging at Vijayawada was adopted at the 1951 Conference. In the Khosla Committee's report on the Krishna-Pennar project, the run-off figures are seen to be different. It would seem that the discharge data needs a further careful scrutiny to provide a correct basis for allocations. The availability of flow in 44 years out of 51 was considered as dependable. This gives a dependability of 86 per cent. At the same conference a dependability of 89 per cent. was accepted for Godavary. The standard accepted practice in India is to plan irrigation projects on a 75 per cent. dependable flow. The Nagarjunsagar project since adopted is also based on 75 per cent. dependable flow. It is obvious that, the 75 per cent. dependable flow should therefore be considered as standard dependable flow, for the purpose of allocation.

A fresh run-off series for Vijayawada has been worked out by the Maharashtra, I & P Dept. (Appendix III) after allowing for the progressive utilisation (as should have been done in the 1951 conference computations) in the upper areas. According to this series the 75 per cent. dependable flow is seen to be 1902 T. M. C. Adding 8 per cent, on account of under estimation

of flow due to adoption of wrong coefficient of discharge at the Vijayawada weir as pointed out by the Chief Engineer, Madras, at the 1951 conference the correct figure of 75 per cent. dependable flow works out to 2054 T. M. C. Out of this certain amount of water would inevitably go to waste across the terminal weir at Vijayawada. Also the regeneration of water from the irrigation in the delta below Vijayawada will not be available for use. The regeneration for the remaining quantity will, however, be available for use and should be counted as an additional asset. This quantity at the rate of 15 per cent. on the gross utilisation is estimated as 228 T. M. C. *vide* Table "C" in Appendix III. The total quantity of water available for allocation thus works out to 2282 T. M. C.

An error is noticed in the figure of existing utilisation ex-Vijayawada reported by Madras at the 1951 Conference. This was shown as 200 T. M. C. In the joint Nandikonda (now called Nagarjunsagar) project report by the Andhra and Hyderabad States, published in 1954, the details of utilisation ex-Vijayawada are given. According to these details the utilisation adds up to 162 T. M. C. only. It would appear that in the 1951 discussions an excess utilisation of 38 T. M. C. had been wrongly allowed for in this utilisation.

It may be observed that if due account is taken of the water available on these computations, it is still quite feasible to review the position and arrive at reallocations that would appear *to satisfy the needs of all the parties without prejudicing any schemes already commenced or any other commitments.*

**Suggested principles for review of allocation ; and suggested reallocations which would satisfy all legitimate claims without prejudicing any existing commitments**

8. The latest studies for utilisation in the Krishna basin in the Bombay State show that about 675 T. M. C. are required for projects in the Maharashtra State including the existing utilisation. Full details of this are given in Appendix IV. The requirement against each project has been carefully worked out after studying the hydrology and topography and may therefore be taken as a reliable figure.

As already indicated, the allocation made in 1951 was done on an *ad hoc* basis without following any principles of equity, etc. With a view to reallocating the water resources of any valley to the participant States the following *principles for division of water resources of inter-State rivers are suggested* :—

(i) The allocation to each State should be based on the total culturable area of the river basin within each State and with due consideration to the contribution of each State to the total flow in the river.

The existing utilisation may be taken as committed but debited to the allocable share of each State.

The people living in the river basin have the primary right to derive benefits from the use of the basin water. The area lying within the basin should, therefore, be primarily entitled to the waters of that river.



Special weightage may be given to the needs for irrigation of the famine and scarcity areas.

(ii) In accordance with the accepted C. W. & P. C. standard for irrigation works ; 75 per cent. dependable flow of the river should be considered as the basis for determining the quantity available for allocation and to this should be added the usable additional flow obtained from regeneration from the irrigated areas.

(iii) Within the limits of its share a State may divert a portion outside the valley for irrigation or for generation of power, as it may deem fit. Its account may however for such diversion be debited with the water diverted plus the regeneration lost to the original valley by such diversion.

(iv) If a State is unable to utilise its share fully, the unusable share should be added to the pool for utilisation in the remaining participating States.

Table " A " below shows the basin area and culturable area of Krishna valley in each of the three participant States and its percentage to the total area in the valley. Similarly Table " B " below gives the percentage irrigated area as a percentage of culturable area in the three States in the Krishna basin as it stood in 1956-57 :—

TABLE " A "

Name of State.	Basin area in square miles.	Percentage of basin area in the State to total basin area of the valley.	Culturable area in the basin 100 acres.	Percentage of culturable area in basin in the State to the total culturable area of the basin.
Maharashtra .. ..	26,377	27.0	1,34,086	28.6
Mysore .. ..	44,640	45.8	2,21,811	47.4
Andhra Pradesh .. ..	26,457	27.2	1,12,152	24.0
Total .. ..	97,474	100.0	4,68,049	100.0

Districtwise split up of the areas in Maharashtra and Andhra Pradesh is given in Appendices V and VI.

TABLE " B "

Name of State.	Culturable area (in 100 acres) in Krishna basin.	Irrigated area (in 100 acres) in Krishna basin as in 1956.	Percentage of irrigated area to the culturable area in the basin.
Maharashtra .. ..	1,34,086	10,669	7.96
Mysore .. ..	2,21,811	9,015	4.07
Andhra Pradesh .. ..	1,12,152	13,585	12.01

Note 1.—The acreage under the irrigated crops is taken as the total acreage so irrigated from all sources under different crops and different seasons in a year. This is referred to by the Statistical Bureau as "Gross irrigated area".

Note 2.—An additional area of 20.6 lakh acres will be brought under irrigation in the Andhra Pradesh on completion of the Nagarjunsagar Project. With this additional acreage under irrigation the total percentage of irrigation in Andhra Pradesh will rise from 27.2 per cent. (in all valleys) to 34 per cent. against the all India average of 17.2 per cent.

The revised figure of 75 per cent. dependable flow available for allocation at Vijayawada anicut is 2282 T.M.C. On the basis of the proportion of cultivable area the entitlement of Krishna waters of the three participant States will be as given below :—

Name of the State.	Percentage culturable area in Krishna Basin.	Share of the State in T. M. C.
Maharashtra .. ..	28.6	655
Mysore .. ..	47.4	1085
Andhra Pradesh .. ..	24.0	542
Total .. ..		2282

Against this basic entitlement (without weightage for scarcity and famine areas) of 655 T.M.C. the demand of Maharashtra is 675 T.M.C. and that of Mysore is 694 T.M.C. against its entitlement of 1085 T.M.C. The demand of Maharashtra is comparable to its entitlement while that of Mysore is less and therefore the demands of these two must be fully met.

That is to say, even without invoking the additional weightage to which Maharashtra and Mysore would be entitled by their (a) higher proportion of water contribution or (b) the greater need of their areas due to scarcity conditions as compared to the regions of Andhra State to be served by the beneficiary Projects of the 1951 allocation, on a consideration of basin area proportions "simpliciter", the entitlements of both Maharashtra and Mysore are large enough to satisfy their requirements in full. Indeed after satisfying these there will still accrue a large unutilised balance from the entitlements of these two States, which of course everybody would welcome the State of Andhra to use (and indeed even to divert outside the Krishna valley if it so chooses) in addition to its proportionate share,

After fully meeting the demands of Maharashtra and Mysore States enough water is left for utilisation by the Andhra State on existent works and works already in progress (which incidentally utilise a large quantum outside the Krishna valley) as shown below :—

Total dependable supply available	...	...	2282 T.M.C.
Demand of Maharashtra	..	..	675 T.M.C.
Demand of Mysore	..	..	694 T.M.C.
			1369 T.M.C.
Total			.. 1369 T.M.C.
Balance left for Andhra is 913 T.M.C.			

It will appear that this balance available to Andhra—being incidentally 60 per cent. over and above its entitlement on a proportionate area basis—is fully adequate to meet all existing commitments (including diversions outside the valley) as well as Projects in hand.

**ANDHRA STATE**  
(after reorganisation).

*Existing works and works started in 1951.*

Delta irrigation ex-Vijayawada	..	..	162 T.M.C.
K. C. Canal	..	..	10 T.M.C.
Pre-Mogul and Rampur Channels	..	..	15 T.M.C.
(Subsequently pointed out by Andhra)			
Tungabhadra Project	..	..	25 T.M.C.
Minor works in ex-Hyderabad State	..	..	79 T.M.C.
Rajolibanda	..	..	16 T.M.C.
Medium and minor works	..	..	5 T.M.C.
			312 T.M.C.
Total			.. 312 T.M.C.

*New projects included in the First and Second Plans.*

Remodelling K. C. Canal	..	..	27 T.M.C.
Tungabhadra High level Canal	..	..	32.5 T.M.C.
Bhairavani Tiper	..	..	2 T.M.C.
Nagarjunsagar Project	...	...	} 479 T.M.C.
Pulichintala Project	..	..	
Additional irrigation	..	..	
ex-Krishna barrage at Vijayawada			
Total			.. 540.5 T.M.C.
Total			.. 852.5 T.M.C.

*Note 1.*—The total demand for the Nagarjunsagar Project including that for Krishna canals ex-Vijayawada as given by the Nagarjunsagar Project authorities is 625 + 16 = 641 T. M. C. exclusive of power requirements of 20 T. M. C. Out of these the provision for the Krishna canals ex-Vijayawada exclusive of the Krishna barrage (162 T.M.C.) has already been made above under existing works. The requirement for the Nagarjunsagar Project inclusive of Krishna canals and Krishna barrage ex-Bezawada thus works out to 625 + 16 (lake losses) minus 162 (Krishna canals) = 641 - 162 = 479 T. M. C.

*Note 2.*—It may be noted that of the 479 T. M. C. provided for irrigation under the Nagarjunsagar Project, 155 T. M. C. are proposed to be utilised for irrigation of 11.9 lakha acres of wet and dry crops in the areas *outside the Krishna valley*.

*Note 3.*—The provision for Pulichintala Project is considered necessary for utilising to the maximum extent the dependable yield of 210 T. M. C. from the catchment between Nagarjunsagar and Vijayawada *vide* page 6 of the joint report on the Nandikonda Project by the Andhra and Hyderabad States. It will be possible to comb out greater portion of this yield only if Pulichintala reservoir is inserted and the floods above Pulichintala Project are absorbed at this lake. The Pulichintala Project will, therefore, have to be taken up to ensure maximum utilisation of the available flow and to reduce the wastage at the Vijayawada anicut to a minimum. Muneru (including Akher) and Paller are tributaries which join Krishna below Pulichintala, and if these rivers are dammed, intercepting a catchment of more than 2,155 sq. miles, the waste could be further reduced.

It will thus be seen that if 75 per cent. dependable yield were considered as the basis for allocation, and fresh and more accurate computations of availability made, not only will the requirements of Andhra Pradesh be fully met but some balance flow will also be left over for further utilisation by that State.

Indeed, there is scope for still further utilisation by the Andhra State in the Krishna basin. It would be relevant to refer here to one more point in this context. The Godavari river which is situated just to the north of the Krishna basin has large water potential in its lower reach which, it would seem, cannot be utilised by the Andhra Pradesh Government in the same valley. On the other hand the water resources in the Krishna valley are limited and possibly Andhra State may want to bring the benefit of irrigation to even larger areas in the Krishna basin. A paper study of the Godavari basin indicates that there is a possibility of constructing a diversion work on the Godavari at Muknur with F.R.L. R.L. 425 and diverting this flow to the Krishna basin by constructing a feeder canal taking off from the weir at R. L. 400 and having a length of 144 miles and a tunnel 14 miles long to cross the bridge between Godavari and the Krishna. The probable site for the weir and the canal alignment is indicated in the accompanying index map. This volume of diverted water which will be of the order of 400 T.M.C. will be able to irrigate a large portion of the area now commanded by the Nagarjunsagar L. B. Canal. It will also be possible to take this water ex-Pulichintala storage towards the R. B. Canal ex-Pulichintala and irrigate considerable area on that bank also. This will enable a proper utilisation of the available resources of the Godavari valley instead of allowing them to go to waste and will simultaneously release a corresponding run-off from the Krishna valley for still wider utilisation in the Krishna basin in Andhra State or even by further diversion in the Pennar Basin. It may be observed that the possibilities of diverting excess Godavari waters to the Krishna basin are already envisaged in the Khosla Committee's Report (please see Appendix D of Khosla Committee's Report) although the site now suggested herein is considerably upstream and capable of rendering a much greater relief of pressure on the Krishna waters.

Should the Andhra Pradesh Government feel the necessity of covering still larger area beyond the irrigation proposed under the Nagarjunsagar L. B. Canal and the area in the Pennar valley it is up to that Government to consider diversion of Godavari waters to Krishna which appears technically feasible.

### Allocation of Godavari waters

9. The allocation of Krishna and Godavari waters was done at one and the same inter-State Conference held in New Delhi in 1951. The basic approach to the problem of allocation of Godavari waters being the same as that for Krishna water, what has already been said about the approach being unreliable to any discernible principle of allocation holds equally good in so far as allocation of Godavari waters at the 1951 Conference is concerned.

Unlike allocation of Krishna waters, however, the allocation of Godavari waters was not done on—

- (a) a basis of 86 per cent. dependability of supplies available,
- (b) on specific demands for specific projects.

The allocation was, however, done equally on an *ad-hoc* basis as in the case of allocation of Krishna waters and was based on figures which were apparently not scrutinised. Two examples of inaccuracies now noticed are given below :

(1) *Inaccuracies in figures of existent utilisation in 1951.*—Some of the figures given by the erstwhile Hyderabad State and the Madras State have now been found to be incorrect *vide* Appendix G. I. The result of accepting these incorrect figures has resulted in under-estimation of water resources available for allocation for future works.

Since the balance water resource available for future works was found to be adequate to meet the demands, the demands and feasibility of future projects made by the various States do not appear to have been scrutinised at the 1951 conference, e.g. Ramapad Sagar Project.

(2) *Inaccuracies in demands.*—It is understood that in the discussion between the Chief Engineers of various States at the 1951 Inter-State Conference some of the demands made by States were scrutinised roughly and were found to be highly exaggerated. Furthermore, the very feasibility of Ramapadsagar Project in the Madras State for which a demand of 1035 T. M. C. was made was questioned.

The allocation made on a basis of such figures of doubtful reliability could hardly be deemed to have been based on demands of specific projects.

Since a dependability of 75 per cent. is now accepted as standard dependability for irrigation projects by the C. W. & P. C., the available 75 per cent., dependable flow should be considered as available for allocation of Godavari waters as against an arbitrary per centage dependability of 89 per cent. adopted at the 1951 Conference. An existent utilisation of 503 T. M. C. was indicated in three States at the 1951 Conference of which 300 T. M. C. were said to be in use on delta irrigation in the Madras State.

A revised run-off series based on discharges observed at Dowlaiswaram and the utilisations upstream of Dowlaiswaram is now worked out *vide* Appendix G.II. From this series it is seen that the 75 per cent. dependable yield available at Dowlaiswaram is 2746 T. M. C. This figure does not include the additional resource due to new regeneration in the river on account of new upper utilisation.

In accordance with the basic principles for division of waters for inter-State rivers already enumerated in the discussion on allocation of Krishna water each participating State should be entitled to the percentage of available dependable flow proportional to the percentage of culturable area in the State to the total culturable area of the basin.

The following is the percentage of areas in the Godavari basin in the various participating States :—

Serial No.	Name of State.	Area in square miles.	Percentage of Basin area.
1	Maharashtra	57,590	49.52
2	Madhya Pradesh	23,840	20.50
3	Andhra Pradesh	26,630	22.90
4	Mysore	1,654	1.42
5	Orissa	6,586	5.66
Total		1,16,300	100.00

The entitlement of the various participating States based on percentage of basin area (details of culturable area in the basin are not available for all States with the Government of Maharashtra) work out as under :

*The demands made by the various States except the Andhra Pradesh are also indicated against each.*

	Percentage entitlement.	Allocation in T. M. C.	Demand in T. M. C.
Maharashtra	49.52	1,360	1,360
Madhya Pradesh	20.50	563	407
Andhra Pradesh	22.90	629	Limited to 629
Mysore	1.42	39	20
Orissa	5.60	155	202
Total		2,746	

For the purposes of this discussion, the proportions of culturable areas are taken as equivalent to the proportions of basin area in the State. The actual allocation may however be done on the actual percentage of culturable area in the State. Against their entitlements the demands of all States except those of Andhra Pradesh and Orissa can be met with from their legitimate share. The Orissa State has not undertaken any works so far and accordingly that State has not incurred any commitments. The share of Orissa should and could therefore be restricted to the entitlement of that State.

In so far as Andhra Pradesh is concerned the existent commitments and works in operation need 463 T. M. C. *vide* Appendix G. III against the legitimate share of that State of 629 T. M. C. That State will have a balance of  $629-463=166$  T. M. C. for future works together with bulk of regeneration from upper utilisation which may amount to 15 per cent. of  $(2746-500=2246)$  2246 T. M. C. or  $336.9=337$  T. M. C.

Furthermore as in the case of the Krishna basin that State could be awarded the remainder of the unused allocation of the upstream States. The Maharashtra Government has so far not been able to prepare its plan for comprehensive utilisation of the Godavari waters and perhaps this is also true of the States of Madhya Pradesh and Orissa. When this is done as in the case of the Krishna, the surplus would be surrendered.

The present *ad hoc* allocation should therefore be revised and reframed on the basis of the percentage culturable area in the basin.

#### A summary

10. In conclusion the case of the State of Maharashtra as made out in this memorandum may be summed up as follows :

The 1951 allocations must be reviewed because—

(a) while purporting to consider requirements of ready Projects with a view to immediate implementation, the 1951 conference ended up with Statewise allocations for 25 years admitting in such allocations projects by no means ready for immediate implementation.

The water allotments demanded for the different projects were apparently not scrutinised before adopting them as the basis for the State-wise allocations.

(b) the 1951 conference did not have information about potentialities of ultimate utilisation—on which basis alone such long term allocations could be considered—in respect of upstream States which due to inherent difficulties of topography were in no position then to estimate their full requirements.

(c) the 1951-allocations are not relatable to any comprehensible principles which alone could be held as determining the ultimate territorial allocations of the limited waters of the Krishna river.

(d) the 1951-allocations were based on incorrect premises as to the availability of waters surplus to existing utilisation.

Moreover, the context of the 1951 conference has been entirely changed by the subsequent reorganisation of States, the original participating State entities having either disappeared or changed out of all proportion. Besides, one State Mysore never ratified the agreement and another Orissa had not participated in the conference at all.

Rational principles for long-term allocation of waters are suggested and it is submitted that if correct computations of availability are made, it is entirely feasible to satisfy the requirements of upstream States which could not frame them at the time of the 1951-conference, and yet leave to the downstream areas their legitimate share as well as substantial surpluses of unutilised upstream entitlements. It is further indicated how more downstream areas can if they think fit further derive the benefit of an additional 400 T. M. C. of water surplus to the Godavari basin by diverting to the Krishna basin and even further southwards to other basins under command.

In the case of the river Godavari also it is suggested what entitlements would be allocable to the upstream States. Over and above the proportionate entitlements, the downstream areas may in due course, as in the case of the Krishna river, utilise the remainder of the waters of the Godavari river not usable on a comprehensive water-planning by the upstream areas.

The Government of Maharashtra would further suggest that after the determination of fresh allocations a machinery may be set up for supplying regularly in future to each participating State full information about projects and undertakings in all other areas in the basin so as to secure the due observance of the allocations determined and obviate possible national waste of funds or prejudice by any action of any of the participants to the interest of any others.



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**APPENDICES**

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## APPENDIX I.

## TABLE 'M'.

Table showing irrigation of 2nd and 3rd crop in Andhra Pradesh (1956-57).

## Krishna Valley

(Excluding Krishna delta.)

	District.				Second crop.	Third crop.	Total.
Nalgonda	..	..	..	..	Nil.	1.34	1.34
Hyderabad	..	..	..	..	Nil.	0.50	0.50
Mahboobnagar	..	..	..	..	Nil.	0.95	0.95
Krishna	..	..	..	..	0.51	....	0.51
Anantapur	..	..	..	..	0.83	0.03	0.86
Medak	..	..	..	..	Nil.	0.90	0.90
Warangal	..	..	..	..	Nil.	0.80	0.80
Other districts	..	..	..	..	0.16	0.07	0.23
						Total ..	<u>6.09</u>

## Delta and other Valleys.

	District.				Second crop.	Third crop.	Total.
Srikakulam	..	..	..	..	0.66	....	0.66
East Godavari	..	..	..	..	1.16	....	1.16
West Godavari	..	..	..	..	1.69	....	1.69
Nellore	..	..	..	..	0.43	....	0.43
Karnool	..	..	..	..	0.16	....	0.16
Cuddapah	..	..	..	..	0.83	0.03	0.86
Chittoor	..	..	..	..	1.06	0.05	1.11
Nizamabad	..	..	..	..	....	0.79	0.79
Karimnagar	..	..	..	..	....	0.99	0.99
Adilabad	..	..	..	..	....	0.19	0.19
						Total ..	<u>8.04</u>

Grand Total, 6.09 + 8.04 = 14.13 lakh acres.

Source.—Table III-B, Page 47 of season and crop-report of Andhra Pradesh.

## APPENDIX II.

D.O., No. CMN. 1059-J.

PUBLIC WORKS DEPARTMENT, SAOHIWALAYA,

Bombay 1, 30th July 1959.

My dear Sivasankar,

In continuation of my D. O. Letter of the 19th June 1959 I am forwarding herewith a copy of a preliminary note prepared by our Water Resources Investigation Circle with reference to the Central Water and Power Commission's note regarding revised allocations of the Krishna waters arising out of the Re-organisation of States on the basis of the 1951 Agreement. A copy of the note is also being sent direct to the C. W. and P. C. by the Chief Engineer (Irrigation Projects). The Department's preliminary comments on the redistribution of Godavari waters will follow shortly.

2. In your letter of 11th May 1959 you have stated that the immediate question is that of considering availability of water allotment for the purpose of selecting irrigation projects in the Krishna and Godavari river basins for inclusion in the Third Five-Year Plan. The list of Third Five-Year Plan Projects to be started in the Krishna basin in Bombay State has not yet been finalised by our Government. I am, however, to say that on the basis of the preliminary thinking done on this subject by the Study Group on Irrigation and Power Constituted by this Government for consideration of Third Plan Projects (of which I happen to be the Chairman) it seems likely that we would be recommending for inclusion in the Third Five-Year Plan, projects in the Krishna basin, designed ultimately to utilise 140.0 t.m.c.ft. of water.

Statement showing expected utilisation of Krishna waters in Bombay State against concrete Schemes (to the end of Third Five-Year Plan).

(Statements referred to below are the statements accompanying Superintending Engineer, Water Resources Investigation Circle's preliminary note with reference to C. W. & P. C.'s note regarding revised allocations of the Krishna waters arising out of the Re-organisation of States).

Item.	Utilisation in t.m.c.ft.
(1) Works already in operation in 1951 Statement II .. .. .	108.90
(2) Works under construction in 1951 Statement III .. .. .	26.02
(3) Works subsequently included in the First Five-Year Plan Statement V ..	102.00
(4) Projects subsequently included in the Second Five-Year Plan Statement VI	35.1
(5) Projects tentatively proposed for inclusion in the Third Five-Year Plan ..	.. .. .

Project.	Annual utilisation planned in t.m.c.ft.
(i) Kukadi Project .. .. .	42.44
(ii) Bhima Project .. .. .	13.82
(iii) Bhima Lift Irrigation Scheme (Ujjani) .. .. .	49.95
(iv) Remodelling Nira Right Bank Canal .. .. .	7.69
(v) Khadakwasla Project Stage II .. .. .	11.00
(vi) Other minor schemes (including the Phonda Hydro- electrical scheme involving a Westward diversion of 6,000 M. cft.).	15.00
	140.00
	140.00
Total ..	412.02

It will be seen from the calculations made in the Departmental note that on the basis of the 1951 Agreement and allowing for the share of the Mysore State according to our reckoning the balance available of Krishna waters for Bombay State for utilisation against new schemes is only 41.9 t.m.c.ft. On the calculations made in the C. W. & P. C.'s note this balance is 40.2 t.m.c.ft. and with correct allocation of Asoga reservoir to Mysore State will be only 24.4 t.m.c.ft. Against this we need for the requirements of our Third Plan Schemes 140.0 t.m.c.ft. as stated in the above table.

3. The Bombay Government has been considering the question of the allocation of Krishna waters for some time and has a strong feeling that the distribution made in 1951 was *ad hoc* and without the basis of any principles of equity and would work out, if treated a permanent allocation, particularly unfairly so far as Bombay State is concerned. We propose to take up in the immediate future the reopening of the entire issue with a view to a more equitable settlement of it. I will indicate briefly below in paragraphs 4 and 5 the ground on which the Government of Bombay have come to this conclusion.

A memorandum will be prepared setting out views in full in this connection, and submitted for consideration at the time of the review of the whole issue. At this juncture I am merely to point out to you, referring only to two or three important factors, how the water resources properly allocable to Bombay State are large enough to permit the inclusion of the above-mentioned Third Plan Projects, which is the immediate issue needing to be considered.

4. The dependable yield of Krishna at Vijayawada appears to be considerably in excess of what was assumed at the inter-State Conference proceeding the 1951 agreement. There is a reference in the minutes of the agreement to the observation of the Chief Engineer, Madras, that the actual flow will be in excess of the recorded gauge flow by 8 per cent. The Chief Engineer, Bombay, also pointed out at the time that the regeneration supplies in the river basin had not been taken into account and that there might be 25 to 40 per cent. of additional water available as regeneration supplies. While these points were noted they have not been taken into account in the allocations made, which were on the basis of the recorded gaugings of 1715 t.m.c.ft. only. In the Departmental note submitted to the C. W. and P. C. it is pointed out (on the most conservative basis) that the total dependable flow for allocation to the three States will be 2,261 t.m.c.ft. against the original figure 1,715 t.m.c.ft. On the basis of the 30 per cent. of this surplus as per the 1951 agreement, the old Bombay State would get 164 t.m.c.ft. Distributing this additional allocation between the present Bombay State areas and those since gone over to Mysore State the new Bombay State would stand to get a further allocation of at least 122 t.m.c.ft.

In the C. W. and P. C.'s note credit is taken, automatically as it were, to the share of Andhra Pradesh of 470 t.m.c.ft. being the allocation originally made to the Madras Government for their Krishna-Pennar Project in the 1951 Agreement. It will be recalled in this connection that at the 1951 discussions the Madras State had demanded the enormous quantity of 825 t.m.c.ft. for the Krishna-Pennar Project and in the Agreement it received rateably an allocation of 470 t.m.c.ft. for this and other two projects of which one was the Pulichintala Project requiring 100 t.m.c.ft. On the creation of a separate State of Andhra Pradesh it is proposed to take credit of this allocation automatically in favour of the Andhra Pradesh.

In the first place such a large allocation to the Krishna-Pennar Project which included substantial provision for the benefit of areas outside Krishna basin is itself open to dispute being in clear contravention of the normal principle of giving a priority, whenever water resources are limited, for utilisation in the basin to which they belong. Further more, the case of the Nagargunsagar Project against which this allocation of the Krishna-Pennar Project is sought to be now shown is not at all on all fours with the original Krishna-Pennar Project. In the view of this Government, even a part from disputing the original allocation, with the dropping of the Krishna-Pennar Project the allocation made for that project must be treated as having lapsed and a fresh view must be taken with regard to the reallocation of this quantum of water resources amongst the different schemes to all sharers in the Krishna waters including the Nagargunsagar Project. In particular we would like to urge in such allocation that the areas in the Krishna basin must have priority in the allocation of Krishna waters.

Even if these two factors along are taken into account it will be obvious enough that the irrigation projects recommended by us for inclusion in the Third Five Year Plan would be more than covered by the allotment that the Bombay State would stand to get. This is the immediate purpose in view and a preliminary decision to this effect would be sufficient for the purpose. So far as the consideration of the final allocation is concerned we would require a further couple of months for making out our case in full.

5. At this stage I might briefly advert to the principal grounds on which the Bombay Government takes the view that the distribution made in 1951 was inequitable and must be reviewed. We will set out our views in more detail in the fuller memorandum that we would be submitting for the proposed fullscale review of the allocation :—

(i) From the summary record of the discussions preceding the agreement, and especially from the opening remarks of the Deputy Chairman of the Planning Commission, it will be seen that the point at issue was utilisation of supplies in the Krishna and Godavari river basins so that an assessment could be made of the relative merits of projects proposed for inclusion in the second part of the Five Year Plan. An *ad hoc* allocation for the immediate future for ready projects was comprehensible in the circumstances of an acute food crisis that then obtained. The Bombay Government's demands were framed on this term of reference. In the result it would appear, however, that the agreement seeks to allocate the waters of the Krishna river for all time amongst the various States.

(ii) Shri V. T. Krishnamachari had stated in his opening remarks that only project which had been thoroughly investigated and found technically, economically and financially justifiable, would be considered. We are not aware whether the Krishna-Pennar Project satisfied this requirement at the material time. There was no time or opportunity at or prior to the conference for the officials of this Government to study the projects advanced by other States against this criterion.

(iii) The allocation was made on the basis of demands made by different States. Whereas Madras State presented a very large total, the reasonableness of which does not seem to have been verified at the time of the Inter-State Conference, on behalf of the Bombay State only a limited number of projects were advanced. This was done by Bombay in the view that only projects fully investigated and ready for implementation in the immediate future were to be proposed in this connection. In any case on a fuller consideration of the matter the Bombay Government finds that there are many other feasible projects and that its requirements of Krishna waters in the long-term perspective are much larger than what was asked for at the 1951 Conference. We feel that for a permanent distribution of the Krishna waters note must be taken of this comprehensive programme of projects.

(iv) In fact the Bombay Government is of the view that while it was correct to assure utilisation against the then existing projects and those under construction, the overall distribution of waters should have been made after taking into consideration some stable permanent factor like for instance, the relative run-offs in the different areas or at least the available culturable areas in the river basin in the concerned States, some weightage perhaps being given to areas affected by famine and scarcity. Each State would thus get its basic percentage entitlement which will include the existing utilisation. As these factors were completely ignored the division apart from its other defects has purported to perpetuate the handicap of the under-developed States.

(v) The Bombay State includes approximately 28.4 per cent. of the total culturable area in the Krishna basin and about 26.51 per cent. of the area in the Krishna basin which is liable to famine and scarcity. Bombay has 28.4 per cent. of the gross area in the Krishna basin. The run off of the catchment in the Bombay area constitutes over 50 per cent. of the total dependable water resources of the Krishna basin. Some criteria in relationship to these proportions ought to be adopted for the purpose of determining the distribution of waters to operate for all time and the *ad hoc* basis on which this was done in the 1951 Agreement ought to be revised.

(vi) Godavari in her lower reach has a large volume of surplus water which, it seems, can be diverted for irrigation in Krishna basin in Andhra State. As the Godavari water would otherwise go to waste, it would be proper to ask Andhra State to make maximum use of Godavari water in Krishna basin and to that extent relieve pressure on Krishna resources enabling allocation of larger shares to areas in upper States which have no alternative source.

The Irrigation and Power potential of the Krishna valley in the Bombay State has now been studied in great detail in the Bombay P. W. D. and this study shows that 590 t.m.c.ft. can be utilised fully in the Bombay State most of which would go to serve chronic, famine and scarcity affected areas. Unless the award is changed very large tracts of these famine areas would never get any relief a position, which it will be appreciated cannot possibly be acquiesced in by the Bombay Government.

6. I am also to say that the limitation on Westward utilisation of water as at the Koyna Hydro-electric and other projects of the Bombay State is not defensible and ought to be also reviewed. The full pros and cons of the matter ought to be reconsidered. The Bombay Government is willing that the issue should be considered from the broad national point of view and not merely the territorial advantage of the Bombay State. Certain aspects relevant for this do not seem to have received adequate attention when this limitation was imposed, viz. :—

(a) The limitation was imposed in the context of *immediate* food requirements. However, some of the irrigation projects that were preferentially favoured by this limitation have not even now reached after eight years the stage of fructification.

(b) Power generation seems planned on downstream projects resulting in the wastage of water in the Bay of Bengal instead of the Arabian sea.

It must be mentioned that the exceptional head of water in the Western Ghats of nearly 1,800 ft. makes, for the same amount of water, power generation infinitely more beneficial than by low-heads in the lower reaches of the Krishna.

(c) The Western parts of Bombay State are much further away from sources of coal for thermal generation of electricity than the areas to be served the power generation in Lower Krishna valley.

(a) Besides, even granting the greater urgency of food for the immediate future, for a long term view the 'economics' of cheap power generation in the west against the additional food production in the lower reaches ought to be assessed on a full consideration of all the pros and cons involved a preference for food over power not assumed merely 'a priori' and axiomatically.

7. I am to request in conclusion that—

(a) steps may be taken for according the necessary clearance from the water availability point of view to Third Five Year Plan Projects in the Krishna basin of Bombay State upto a total of 140 t.m.c.ft. as requested in paragraph 2 above. For this purpose any preliminary conference or discussions that may be necessary may be held forthwith.

(b) Discussions organised, perhaps three or four months hence, after circulating the points of view of the different States for a complete review of the 1951 allocations. In this connection I am to suggest that arrangements should be made by the Centre for supplying any project reports of other States wherever they are needed for a study of this issue by another State. At present we are finding difficulty in obtaining these.

(c) Interim to such a review of the whole issue, in the opinion of the Bombay Government it is the duty of the Government of India to see that no 'fait accompli' calculated to prejudice the review is acquiesced in. In particular, I am to invite attention to the reported large utilisations to which it is said the Nagarjunsagar Project is being constructed.

With kind regards,

Yours sincerely,

(Signed) S. G. BARVE.

Shri T. Sivasankar, I.C.S.,  
Secretary to the Government of India,  
Ministry of Irrigation and Power, NEW DELHI.

## APPENDIX III.

*Note on availability of run-off at Vijayawada on Krishna River.*

1. *Yields of the Krishna river at Vijayawada.*—In statement 'A' of the printed Minutes of the 1951 inter State Conference the total yields of the Krishna are derived by adding to the observed discharges of the river at the Vijayawada nicut, an upstream utilisation of 250 T. M. C. From the run-off series the dependable flow (assumed arbitrarily at 86 per cent. i.e., 44 years out of 51) was found to be 1,706 T. M. C., rounded off to 1,745 T. M. C.

2. Actually three sets of discharge observations are on record; the one furnished by the C. W. and P. C. at the 1951 Conference, another one presented by the Madras Government to the Khosla Committee on the Krishna-Pennar Project and yet a third one given by the Chief Engineer, Electricity Projects, Andhra State. Though the differences are not very large it would be desirable to scrutinise the different sets of figures and adopt the correct ones.

3. It was evidently incorrect to assume a constant upper utilisation of 250 T. M. C. for all the years since 1894 because many works which existed in 1951 were not constructed in the earlier years. A fresh run-off series for Vijayawada has been worked out by adopting the discharge figures given in the Khosla Committee's report and adding the upper utilisation for the respective years, estimated on the basis of the available information. The progressive upper utilisation is given in Statement 'A' and the revised run-off series in Statements 'B-I and B-II'.

The 75 per cent. dependable flow, according to this series is seen to be 1902 T. M. C.

## STATEMENT A.

*Table showing utilisation in T. M. C. in the Krishna Catchment above Bezwada.*

(Excluding utilisation Ex-Bezwada Canals).

Serial No.	State.	Name of work.	Utilisation in T. M. C.	Progressive total in T. M. C.
1	2	3	4	5
<i>1893 to 1906.</i>				
1	Madras	.. (a) Premogul and Ramapur Channels.	15·00	
2	Bombay	.. (a) Dhupadal weir ..	4·5	
		.. (b) Lake Fife ..	5·0	
		.. (c) Bhatghar lake ..	8·0	
		.. (d) First class Irrigation works.	13·0	
		.. (e) M. I. Tanks ..	7·5	
			38·0	
3	Mysore	.. Nil.		38·00
				Nil.
4	Hyderabad	.. (a) Minor works ..	75·00	
				128·00
				128·00
<i>1907 to 1915.</i>				
1	Madras	.. Nil.		Nil.
2	Bombay	.. Nil.		Nil.
3	Mysore	.. (a) Vanivilas-sagar ..	30·00	30·00
4	Hyderabad	.. Nil.		Nil.
				30·00
				158·00

STATEMENT A—*contd.*

Serial No.	State.	Name of work.	Utilisation in T. M. C.	Progressive total in T. M. C.
1	2	3	4	5
<i>1916 to 1920.</i>				
1	Madras	.. Nil.	Nil.	
2	Bombay	.. (a) Lonavala lake (b) Valawan lake (c) Shirvata lake } ..	9.5 say, 10.00	
3	Mysore	.. Nil.	Nil.	
4	Hyderabad	.. Nil.	Nil.	
			10.00	188.00
<i>1921 to 1927.</i>				
1	Madras	.. Nil.	Nil.	
2	Bombay	.. (a) Second Class Minor Irrigation works.	11.00	
3	Mysore	.. Nil.	Nil.	
4	Hyderabad	.. (a) Osmanasagar and Minor works.	9.00	
			20.00	188.00
<i>1928-1950.</i>				
1	Madras	.. (a) K. C. Canals ..	10.00 10.00	
2	Bombay	.. (a) Bhatghar (New) .. (b) Mulshi and Andhra lake.	30.00 31.03 <u>61.3</u>	
			61.3	
3	Mysore	.. Nil.	Nil.	
4	Hyderabad	.. (a) Himayat-sagar and Minor works.	6.00 6.00	
			77.3	
			say, 77.00	265.00 T.M.C.



## STATEMENT B-I.

*Statement showing the water resources of the Krishna River over the last 51 years computed by (the adding upper utilisation progressively to the annual run-off figure at Vijaywada Anicut. The run-off figures at Vijaywada Anicut are taken from Khosla Committee's Report on the Krishna-Pennar Project, pp. 94 to 97.)*

Serial No.	Year.	Run-off T. M. C.	Upper Utilisation in T. M. C.	Total in T. M. C.	Remarks.
1	2	3	4	5	6
1	1894-95	.. 1,809*	128	1,937	*As given at the 1951 inter-State Conference.
2	1895-96	.. 1,937	128	2,065	
3	1896-97	.. 2,366	128	2,494	
4	1897-98	.. 2,450	128	2,578	
5	1898-99	.. 2,342	128	2,470	
6	1899-1900	.. 879	128	1,007	
7	1900-01	.. 2,550	128	2,678	
8	1901-02	.. 1,882	128	2,010	
9	1902-03	.. 1,722	128	1,850	
10	1903-04	.. 2,906	128	3,034	
11	1904-05	.. 1,528	128	1,656	
12	1905-06	.. 1,066	128	1,194	
13	1906-07	.. 1,702	128	1,830	
14	1907-08	.. 1,943	158	2,101	
15	1908-09	.. 2,178	158	2,336	
16	1909-10	.. 1,857	158	2,015	
17	1910-11	.. 2,087	158	2,245	
18	1911-12	.. 1,218	158	1,376	
19	1912-13	.. 1,756	158	1,914	
20	1913-14	.. 1,576	158	1,734	
21	1914-15	.. 2,751	158	2,909	
22	1915-16	.. 2,146	158	2,304	
23	1916-17	.. 3,473	168	3,641	
24	1917-18	.. 2,652	168	2,820	

## STATEMENT B-I—contd.

Serial No.	Year.	Run-off T. M. C.	Upper Utilisation in T. M. C.	Total in T. M. C.	Remarks.
1	2	3	4	5	6
25	1918-19	.. 777	168	945	
26	1919-20	.. 1,949	168	2,117	
27	1920-21	.. 1,378	168	1,546	
28	1921-22	.. 1,787	188	1,975	
29	1922-23	.. 1,761	188	1,949	
30	1923-24	.. 2,021	188	2,209	
31	1924-25	.. 1,935	188	2,123	
32	1925-26	.. 1,837	188	2,025	
33	1926-27	.. 1,904	188	2,092	
34	1927-28	.. 2,039	188	2,227	
35	1928-29	.. 1,920	265	2,185	
36	1929-30	.. 1,655	265	1,920	
37	1930-31	.. 1,901	265	2,166	
38	1931-32	.. 2,533	265	2,798	
39	1932-33	.. 2,371	265	2,636	
40	1933-34	.. 2,640	265	2,905	
41	1934-35	.. 1,759	265	2,024	
42	1935-36	.. 1,622	265	1,887	
43	1936-37	.. 1,677	265	1,942	
44	1937-38	.. 1,704	265	1,969	
45	1938-39	.. 2,165	265	2,430	
46	1939-40	.. 1,702	265	2,057	
47	1940-41	.. 1,804	265	2,069	
48	1941-42	.. 1,334	265	1,599	
49	1942-43	.. 1,678	265	1,943	
50	1943-44	.. 1,582	265	1,547	
51	1944-45	.. 1,701*	265	1,966	* Based on latest figures discharge.

## STATEMENT B-II

*Statement showing the water resources of the Krishna River over the last 51 years computed by adding upper utilisation progressively to the annual run-off figure at Vijayawada Anicut, arranged in descending order.*

Serial No.	Year.	Run-off.	Remarks.
1	1916-17	.. 3,641	
2	1903-04	.. 3,034	
3	1914-15	.. 2,900	
4	1933-34	.. 2,905	
5	1917-18	.. 2,820	
6	1931-32	.. 2,798	
7	1900-01	.. 2,678	
8	1932-33	.. 2,636	
9	1897-98	.. 2,578	
10	1896-97	.. 2,494	
11	1898-99	.. 2,470	
12	1938-39	.. 2,430	
13	1908-09	.. 2,336	
14	1915-16	.. 2,304	
15	1910-11	.. 2,245	
16	1927-28	.. 2,227	
17	1923-24	.. 2,209	
18	1928-29	.. 2,185	
19	1930-31	.. 2,166	
20	1919-20	.. 2,139	
21	1924-25	.. 2,123	
22	1907-08	.. 2,101	
23	1926-27	.. 2,092	
24	1940-41	.. 2,069	
25	1895-96	.. 2,065	
26	1939-40	.. 2,057	
27	1925-26	.. 2,025	
28	1934-35	.. 2,024	
29	1909-10	.. 2,015	

## STATEMENT B-II—contd.

Serial No.	Year.	Run-off.	Remarks.
30	1901-02	.. 2,010	
31	1921-22	.. 1,975	
32	1937-38	.. 1,969	
33	1944-45	.. 1,966	
34	1922-23	.. 1,949	
35	1942-43	.. 1,943	
36	1936-37	.. 1,942	
37	1894-95	.. 1,937	
38	1929-30	.. 1,920	
39	1912-13	.. 1,914	} 75 per cent. dependable yield 1,902 T.M.C.
40	1935-36	.. 1,867	
41	1902-03	.. 1,850	
42	1943-44	.. 1,847	
43	1906-07	.. 1,830	
44	1913-14	.. 1,734	
45	1904-05	.. 1,656	44/51 per cent.
46	1941-42	.. 1,599	
47	1920-21	.. 1,546	
48	1911-12	.. 1,376	
49	1905-06	.. 1,194	
50	1899-1900	.. 1,007	
51	1918-19	.. 945	

TABLE "C".

75 per cent. dependable flow	..	..	..	..	T.M.C. 2,054
Utilisation in 1951	..	..	..	..	450
Further declaration of pre 1951 utilisation	..	..	..	..	15
Total pre 1951 utilisation	..	..	..	..	465
Fresh Utilisation available after 1951 : 2,054 = 465	..	..	..	..	1,589
Diversion for power outside the valley at Koyna	..	..	..	..	68
Balance fresh utilisation capable of giving regeneration	..	..	..	..	1,521
Regeneration at 15 per cent.	..	..	..	..	228

## APPENDIX IV.

Statement showing list of post-1951 works in Krishna Valley proposed by the Government of Maharashtra.

Serial No. 1	Name of Project. 2	Utilisation in T.M.C ft. 3
<i>A—Bhima Valley in Maharashtra.</i>		
1	Tank at Burhanpur .. .. .	1-415
2	Nira Canals extension .. .. .	31-000
3	Mutha Canals extension .. .. .	32-000
4	Velholi Storage Project .. .. .	5-160
5	Bhama at Askheda .. .. .	1-000
6	Bhima Project .. .. .	13-830
7	Pargaon Lift Irrigation Project on Bhima .. .. .	6-260
8	Ujjani Lift Irrigation Project on Bhima .. .. .	39-400
9	Kukadi Project .. .. .	41-400
10	Ghod Project .. .. .	10-550
11	Bori and Harni Project .. .. .	2-850
12	Sina at Nimgaon Gangurde .. .. .	1-900
13	Sina at Kolegaon .. .. .	4-500
14	New Minor Irrigation Works in Bhima Valley .. .. .	29-400
	Total ..	220-365
<i>B—Krishna Valley in Maharashtra.</i>		
1	Koyna Hydro Electric Project .. .. .	123-00
2	Koyna Irrigation Project .. .. .	41-50
3	Krishna at Dhoni .. .. .	10-22
4	Kudali at Golewadi .. .. .	1-99
5	Venna at Medha .. .. .	3-53
6	Urmodi at Parali .. .. .	6-63
7	Tarali at Savarghar .. .. .	2-66
8	Werna at Ghandoli .. .. .	24-66
9	Kasari at Kumbhewadi .. .. .	14-64
10	Kasari at Pohale .. .. .	8-00
11	Kumbhi at Revewadi .. .. .	4-53
12	Kumbhi at Tandulwadi .. .. .	1-10
13	Tulshi at Dhamod .. .. .	2-10
14	Extra for Bhogawati at Radhanagari .. .. .	4-30
15	Dudhaganga at Kalamwadi .. .. .	25-50
16	Vedaganga Project .. .. .	12-10
17	Yerala at Yeralwadi .. .. .	1-60
18	Yerala at Ramapur .. .. .	3-00
19	Krishna at Koparda weir .. .. .	7-40
20	Other New Minor Works in Krishna Valley .. .. .	20-00
	Total ..	318-46
	Total of Tables "A" and "B"	220-365
		+318-460
		538-825
		T. M. C ft.
<i>Add—</i>		
(1)	Existing works already under operation in 1951 .. .. .	108-850
(2)	Works under construction in 1951 .. .. .	27-300
	Grand Total ..	674-975
		Say 675 T. M. C ft.

## APPENDIX V.

Districtwise split up of the areas in Maharashtra State (Krishna Basin), 1956-57.

(Irrigated area excludes area irrigated by wells.)

Districts.	Total area of the district in sq. miles (according to village papers).	Area of the district in Krishna Valley in sq. miles.	Net area irrigated by				Total net area irrigated (col.4+5+6+7 excluding wells.)	Net area sown.	Per cent. of net area irrigated to net area sown (100×col. 8/Col.9)	Area sown more than once in the same year.	Area irrigated more than once in the same year (Excl. wells)	Total gross area of crops irrigated (col. 8+12).	Total gross sown area (col. 9+11).	Per cent. of total gross irrigated area to the total sown area (100× col. 13/14).
			Govt. canals.	Private canals.	Tanks	Other Sources.								
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
POONA DIVISION.														
Areas are in '00 Acres.														
1. Poona ..	6008	6008	984	50	59	17	1110	24595	4.5	2160	214	1324	26755	5.0
2. North Satara	4071	4071	519	357	18	12	906	16780	5.4	1307	284	1190	18087	6.0
3. South Satara.	3326	3326	25	17	..	34	76	15814	0.5	427	19	95	16241	0.6
4. Kolhapur ..	3128	3003	39	1	13	426	479	9881	4.8	213	14	4.93	10094	4.9
5. Sholapur ..	5786	5786	600	1	25	..	626	29053	2.2	577	131	7.57	29530	2.6
6. Ahmednagar .	6570	2299	30	15	1	..	46	10866	0.4	666	9	55	11532	0.5
AURANGABAD DIVISION.														
1. Osmanabad ..	5415	677	5	..	1	8	14	3293	0.4	60	2	16	3353	0.5
2. Bhir ..	4312	1207	..	..	16	7	23	5454	0.4	273	6	29	5727	0.5
Total ..	38616	26377	2202	441	133	504	3280	115636	2.8	5683	679	3959	121319	3.3

Note.—(i) Column No. 2 according to Bureau of Economics and Statistics (Maharashtra), Bombay-1.

(ii) Figures in Columns 4 to 15 are taken from Season and Crop Report, 1956-57 from the Director of Agriculture, Poona.

ANDHRA PRADESH														
1. Nalgonda. ..	53,53	53,53	3,42	12	14,48	60	18,62	1,95,32	9.5	11,40	6,88	25,50	2,06,72	12.3
2. Hyderabad ..	29,45	29,45	1,15	12	6,49	107	8,83	89,64	9.9	30	4	8,87	89,94	9.9
3. Mahbubnagar.	71,46	71,46	1,68	4	18,17	99	20,88	2,47,72	8.4	4,70	3,48	24,36	2,52,42	9.7
4. Krishna ..	34,95	9,09	16,18	..	2,95	50	19,61	33,80	58.0	5,81	1,38	20,99	39,61	53.0
5. Guntur ..	57,71	14,03	11,45	..	68	3	12,16	51,22	23.7	6,50	18	12,34	57,72	21.4
6. Kurnool ..	92,10	33,16	2,45	..	1,90	28	4,63	1,02,50	4.5	6,85	46	5,09	1,09,35	4.7
7. Anantpur ..	73,88	14,54	95	1	2,16	15	3,27	50,20	6.5	2,33	98	4,25	52,53	8.1
8. Medak ..	38,06	6,26	20	1	2,86	21	3,28	19,51	16.8	1,16	67	3,95	20,67	19.1
9. Warangal ..	39,98	14,39	46	2	8,75	5	9,28	42,40	21.9	3,00	1,58	10,86	45,40	23.9
10. Khammam ..	43,40	18,66	1,17	1	4,13	7	5,38	37,20	14.5	....	96	6,34	37,20	17.0
Total ..	534,52	2,64,57	39,09	33	62,57	3,95	1,05,94	8,69,51	12.2	42,05	16,61	1,22,55	9,11,56	13.4

Reference.—(i) Column No. 2 from Season and Crop Report of Andhra Pradesh, 1956-57.

(ii) Figures in Column 13 to 15 are taken from Season and Crop Report, of Andhra Pradesh, 1956-57 (pages 42, 45 and 46).

(iii) Districtwise figures given for Column 4 to 14 in the Season and Crop report of Andhra Pradesh, 1956-57 are reduced in the ratio of Column, 3/Col. 2 and these reduced figures are given in Column 4 to 14 above.

N.B.—Column 8=Total net area irrigated minus the net area irrigated by wells.

Col. 12 has been intimated by deflating the figures of total Area Irrigated more than once in the same report (i.e. including wells) by the ratio of Total net area irrigated (excluding wells) and the total net area irrigated (including wells).

## APPENDIX VI

Statement showing the distribution of the total area and the culturable area of KRISHNA BASIN in various districts of Maharashtra, Mysore and Andhra Pradesh.

Serial No.	Name of the district	Total area of the district in square miles.	Culturable area of the district in hundred acres.	Culturable area falling in Krishna upto Bezwada anicut.		Percentage of area in State to total basin area.	Culturable area in hundred acres in the district	Culturable area in hundred acres in Krishna Valley.	Percentage culturable area in the State to the total culturable area in the basin.	Remarks
				In square miles.	In hundred acres.					
1	2	3	4	5	6	7	8	9	10	11
<b>(A) MAHARASHTRA.</b>										
1	Poona .. ..	6,008	38,452	6,008	38,452	....	28,474	28,474	....	..
2	North Satara .. ..	4,071	26,056	4,071	26,056	....	19,007	19,007	....	..
3	South Satara .. ..	3,326	21,287	3,326	21,287	....	18,404	18,404	....	..
4	Kolhapur .. ..	3,128	20,022	3,003	19,218	....	13,261	12,730	....	..
5	Sholapur .. ..	5,786	37,031	5,786	37,031	....	32,875	32,875	....	..
6	Ahmednagar .. ..	6,570	42,049	2,299	14,714	....	32,840	11,497	....	..
7	Osmanabad .. ..	5,415	34,662	677	4,333	....	32,605	4,075	....	..
8	Bhir .. ..	4,312	27,590	1,207	7,724	....	25,084	7,024	....	..
	<b>Total .. ..</b>	<b>38,616</b>	<b>2,47,158</b>	<b>28,377</b>	<b>1,68,815</b>	<b>27.1</b>	<b>2,02,559</b>	<b>1,34,086</b>	<b>28.6</b>	<b>....</b>
<b>(B) MYSORE.</b>										
1	Chitaldurg .. ..	4,136	26,470	4,136	26,470	....	17,253	17,253	....	..
2	Bellary .. ..	3,821	24,454	3,821	24,454	....	15,939	15,939	....	..
3	Belgaum .. ..	5,158	33,011	5,158	33,011	....	25,294	25,294	....	..
4	Bijapur .. ..	6,563	42,003	6,563	42,003	....	37,628	37,628	....	..
5	Raichur .. ..	5,436	34,790	5,436	34,790	....	29,297	29,297	....	..
6	Gulbarga .. ..	6,271	40,134	6,271	40,134	....	34,092	34,092	....	..
7	Tumkar .. ..	4,058	25,971	1,690	10,816	....	16,928	7,060	....	..
8	Shimoga .. ..	3,987	25,517	3,223	20,627	....	16,632	13,445	....	..
9	Chickmanglur .. ..	2,723	17,427	2,188	14,003	....	11,359	9,128	....	..
10	Dharwar .. ..	5,285	33,824	5,180	33,152	....	28,567	27,999	....	..
11	Bidar .. ..	2,082	13,325	462	2,957	....	11,494	2,551	....	..
12	Hassan .. ..	2,618	16,755	512	3,277	....	3,555	2,125	....	..
	<b>Total .. ..</b>	<b>52,138</b>	<b>3,33,681</b>	<b>44,640</b>	<b>2,85,694</b>	<b>45.8</b>	<b>2,48,038</b>	<b>2,21,811</b>	<b>47.4</b>	<b>....</b>
<b>(C) ANDHRA PRADESH.</b>										
1	Nalgonda .. ..	5,253	34,257	5,353	34,257	....	24,571	24,571	....	..
2	Hyderabad .. ..	2,945	18,848	2,945	18,848	....	11,938	11,938	....	..
3	Mahabubnagar .. ..	7,146	45,733	7,146	45,733	....	32,084	32,084	....	..
4	Krishna .. ..	3,495	22,368	909	5,818	....	15,046	3,913	....	..
5	Guntur .. ..	5,771	36,937	1,403	8,979	....	27,115	6,592	....	..
6	Kurnool .. ..	9,210	58,946	3,316	21,222	....	36,366	13,092	....	..
7	Anantapur .. ..	7,388	47,283	1,454	9,306	....	34,660	6,821	....	..
8	Medak .. ..	3,806	24,363	626	4,006	....	16,075	2,643	....	..
9	Warangal .. ..	3,998	25,591	1,439	9,210	....	15,960	5,745	....	..
10	Khammam .. ..	4,340	27,776	1,866	11,942	....	11,055	4,753	....	..
	<b>Total .. ..</b>	<b>53,452</b>	<b>3,42,102</b>	<b>26,457</b>	<b>1,69,321</b>	<b>27.1</b>	<b>2,24,870</b>	<b>1,12,152</b>	<b>24.0</b>	<b>..</b>

Total of Col. 6 (A+B+C) = 6,23,830.

Total of Col. 9 (A+B+C) = 4,68,049.

Source :—Col. 3—(a) For Maharashtra.—Handbook of Basic Statistics of Maharashtra State, 1960. Page 52. Ref. period 1956-57.

(b) For Mysore—Statistical outline of Mysore, 1957. Page 17.

(c) For Andhra Pradesh.—Season and Crop Report of Andhra Pradesh, 1956-57, Page 42.

Col. 8—(a) For Maharashtra.—Handbook of Basic statistics of Maharashtra State, 1960. Page 52, Ref. period 1956-57.

(b) For Mysore—(i) For Belgaum, Bijapur and Dharwar Season and Crop Report of Bombay State, 1955-56. Page 50. Figures for Belgaum district adjusted for Chandgad Taluka on the basis of total area.

(ii) For Raichur, Gulbarga and Bidar Statistical Abstract, Hyderabad State, 1955 Page 21. Figure for Bidar district adjusted on the basis of total area for the areas transferred to other districts. In case of Raichur and Gulbarga area figures were adjusted to cover the difference between the geographical area reported in the Mysore Abstract and Hyderabad Abstract.

(iii) For other districts of Mysore the culturable area is obtained by assuming the same percentage of culturable area to the total area in Mysore State as reported in the statistical outline of Mysore State, 1957, Page 53.

Col. 9—Figures in Col. 9 are deflated in the same ratio of Col. (6) to Col. (4).

## APPENDIX G-I

1. The ex-Madras State had shown an annual utilisation of 300 T. m. c. ft., on the delta irrigation. This is a very old irrigation work which has been fully developed for a long time. Figures of actual canal withdrawals ex-Dowalaishwaram from the year 1939-40 to 1953-54 were obtained from the records of Andhra Pradesh. From these figures it is seen that the actual average utilisation in 14 years just preceding the 1951 agreement was only 246 R. m. c. ft., against a figure of 300 T.m.c. ft., given by the Madras Government at the Conference.

2. The Planned utilisation for the work of Godavari North Canal (a work stated to be in progress in 1951 by the ex-Hyderabad Government) was indicated at 53.0 T. m. c. ft., Actually there was no such work as Godavari North Canal in progress. In 1951 the only work which was in progress and was referred to as Godavari North Canal was the Kaddam Dam Project. The 75 per cent. dependable yield at Kaddam dam site as estimated by the Water Resources Investigation Circle is of the order of 20 T. m. c. ft., and 85 per cent. dependable yield is of the order of 18 T. m. c. ft., The Godavari North Canal utilisation could in reality be of the order of 18 T. m. c. ft. The utilisation of 53.0 T. m. c. ft. shown at the Conference does not therefore appear to be correct.

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## APPENDIX G-II.

*Run-off series of the Godavari River at Dowleshwaram.*

1. STATEMENT 'A'.
2. STATEMENT 'B-I'.
3. STATEMENT 'B-II'.

## STATEMENT A.

*Table showing utilisation in T. M. C. Ft. in Godavari catchment above Dhowaleshwaram  
(Excluding utilisation Ex-Dhowaleshwaram).*

Serial No.	Year (From to) and State.	Name of Work.	Utilisation in T. M. C. Ft.	Progressive total in T. M. C. Ft.
1	2	3	4	5
1	1881-1910/Bombay Ex-Hyderabad, M.P.	Minor works ..	92.00 30.00	.... 122.00
2	1911/Bombay ..	Waghad Dam ..	0.78	122.78
3	1912/Bombay ..	Darna Dam ..	11.62	134.40
4	1913-14/Ex-M. P. ..	Ramtek Dam ..	6.07	140.47
5	1915-17/Ex-M. P. ..	Kharibandha Dam } Chandpur Dam }	0.87 1.72	143.06
6	1918-20/Ex-M. P. ..	Asola-Mendha Dam	3.93	146.99
7	1921/M. P. ..	Jumania Dam ..	0.48	147.47
8	1922/Ex-Hyderabad.	Alair (Pocharam) Dam	3.61	151.08
9	1923-24/M. P. Ex-M. P. Ex-M. P.	Sarathi Dam .. Charkamara Dam .. Bodalkasa Dam ..	0.86 1.16 1.02	154.12
10	1925/Ex-M. P. ..	Ghoranjheri Dam	2.05	156.17
11	1926/Bombay .. Ex-Hyderabad ..	Wilson Dam .. Royenpalli Dam ..	16.50 0.30	172.97
12	1927-1930/M. P. ..	Bori Dam ..	0.53	173.50
13	1931-1946/ Ex-Hyderabad.	Nizamsagar Dam	58.00	231.50

## STATEMENT B-I.

*Statement showing the water resources of the Godavari river for a period of 33 years computed by adding upper utilization progressively to the annual run-off at Dhowalshwaram.*

Serial No.	Year.	Utilisation upstream runoff.	Serial No.	Year.	Utilisation upstream runoff.
1	1881	3,526	34	1914	5,438
2	1882	3,822	35	1915	3,912
3	1883	5,702	36	1916	4,575
4	1884	5,293	37	1917	5,584
5	1885	4,534	38	1918	2,882
6	1886	4,343	39	1919	4,084
7	1887	5,396	40	1920	1,104
8	1888	2,676	41	1921	3,224
9	1889	2,581	42	1922	3,105
10	1890	4,853	43	1923	2,669
11	1891	4,198	44	1924	2,638
12	1892	4,393	45	1925	3,438
13	1893	5,916	46	1926	....
14	1894	4,416	47	1927	3,873
15	1895	3,325	48	1928	3,416
16	1896	3,515	49	1929	3,116
17	1897	3,547	50	1930	459
18	1898	3,002	51	1931	5,009
19	1899	581	52	1932	4,006
20	1900	3,547	53	1933	4,976
21	1901	2,431	54	1934	4,878
22	1902	1,602	55	1935	3,766
23	1903	4,125	56	1936	4,389
24	1904	2,015	57	1937	631
25	1905	2,376	58	1938	5,084
26	1906	3,190	59	1939	2,690
27	1907	5,481	60	1940	4,412
28	1908	4,077	61	1941	1,653
29	1909	2,493	62	1942	4,459
30	1910	4,547	63	1943	4,033
31	1911	2,612	64	1944	4,510
32	1912	3,089	65	1945	4,451
33	1913	2,803	66	1946	3,830

## STATEMENT B-II.

*Statement showing the water resources of the Godavari river over the last 33 years computed by adding upper utilization progressively to the annual run-off figure at Dowalshwaram in descending order.*

Serial No.	Year.	Series in descending order.	Serial No.	Year.	Series in descending order.
1	1893	5,916	34	1935	3,766
2	1883	5,702	35	1897	3,547
3	1917	5,584	36	1900	3,547
4	1907	5,481	37	1881	3,526
5	1914	5,438	38	1896	3,515
6	1887	5,396	39	1925	3,538
7	1884	5,293	40	1928	3,416
8	1938	5,084	41	1895	3,325
9	1931	5,009	42	1921	3,224
10	1933	4,976	43	1906	3,190
11	1934	4,878	44	1929	3,116
12	1890	4,853	45	1922	3,105
13	1916	4,575	46	1912	3,089
14	1910	4,547	47	1898	3,002
15	1885	4,534	48	1918	2,882
16	1944	4,510	49	1913	2,803
17	1942	4,459	50	1939	2,690
18	1945	4,451	51	1888	2,676
19	1894	4,416	52	1923	2,669
20	1940	4,412	53	1924	2,638
21	1892	4,393	54	1911	2,612
22	1936	4,389	55	1889	2,581
23	1886	4,343	56	1909	2,493
24	1891	4,198	57	1901	2,431
25	1903	4,125	58	1905	2,376
26	1919	4,084	59	1904	2,015
27	1908	4,077	60	1941	1,653
28	1943	4,033	61	1902	1,602
29	1932	4,007	62	1920	1,104
30	1915	3,912	63	1937	631
31	1927	3,873	64	1899	581
32	1946	3,830	65	1930	459
33	1882	3,822	66	1926	.....

75 per cent. dependable yield = 2,746 T. M. C.

## APPENDIX G-III.

## ANDHRA PRADESH.

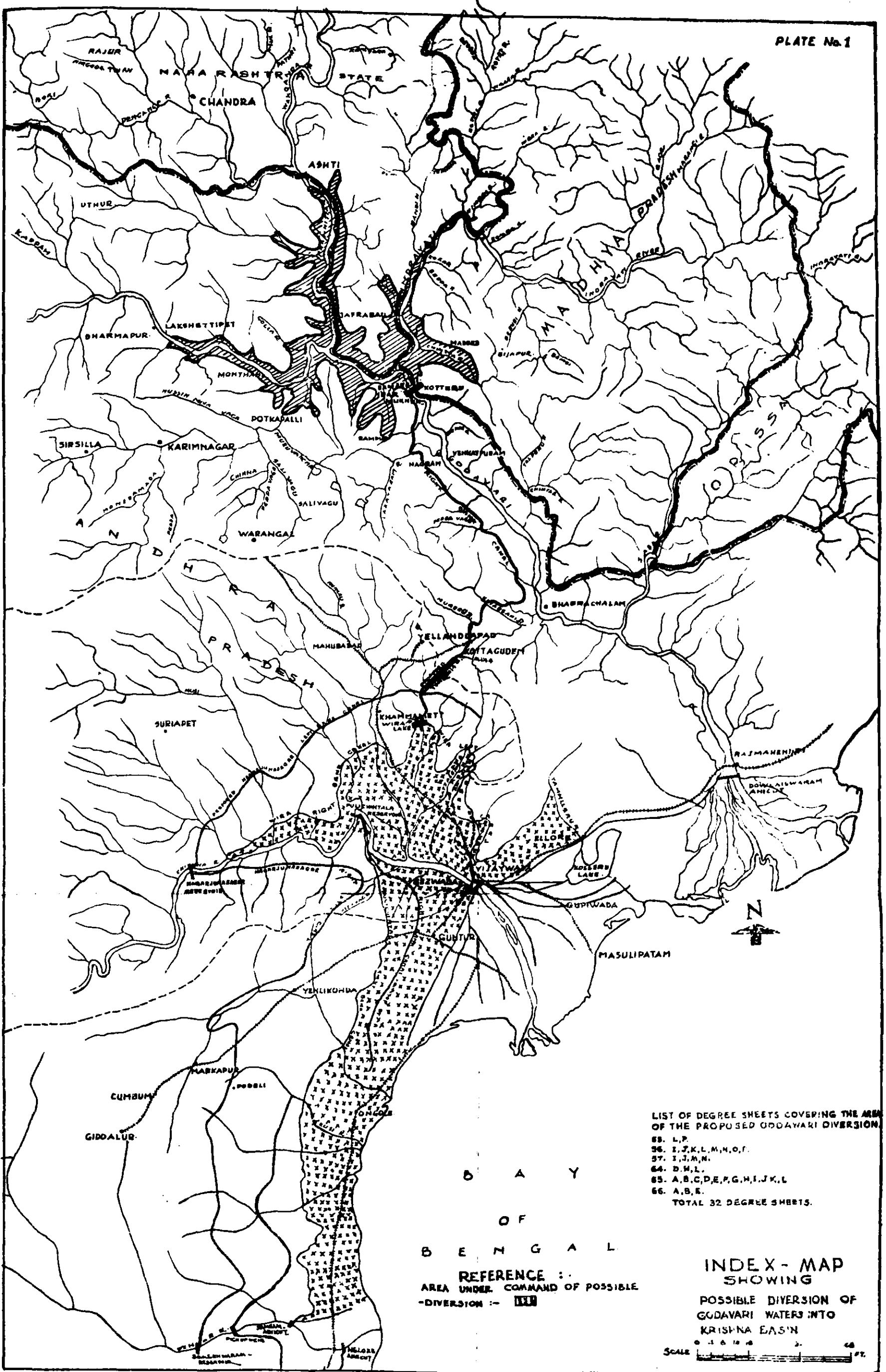
*Existent Utilisation and Commitments.*

1. Delta Irrigation	..	..	..	..	..	246 T. M. C. (and not 300 T.M.C.)
2. Projects of former Hyderabad State			..	..	..	148 T. M. C.
3. Kaddam Project	..	..	..	..	..	53 T. M. C.
4. Sirala Project	..	..	}	..	..	16 T. M. C.
5. Swarna and other Project	..	..				
						<hr/> 463 T. M. C. <hr/>

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**PLATES**

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LIST OF DEGREE SHEETS COVERING THE AREA OF THE PROPOSED GODAVARI DIVERSION

- 63. L.P.
- 66. I, J, K, L, M, N, O, P.
- 67. I, J, M, N.
- 64. D, H, L.
- 65. A, B, C, D, E, F, G, H, I, J, K, L.
- 66. A, B, E.

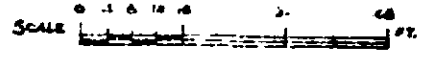
TOTAL 32 DEGREE SHEETS.

B A Y  
O F  
B E N G A L

REFERENCE :  
AREA UNDER COMMAND OF POSSIBLE  
DIVERSION :-

INDEX - MAP  
SHOWING

POSSIBLE DIVERSION OF  
GODAVARI WATERS INTO  
KRISHNA BASIN

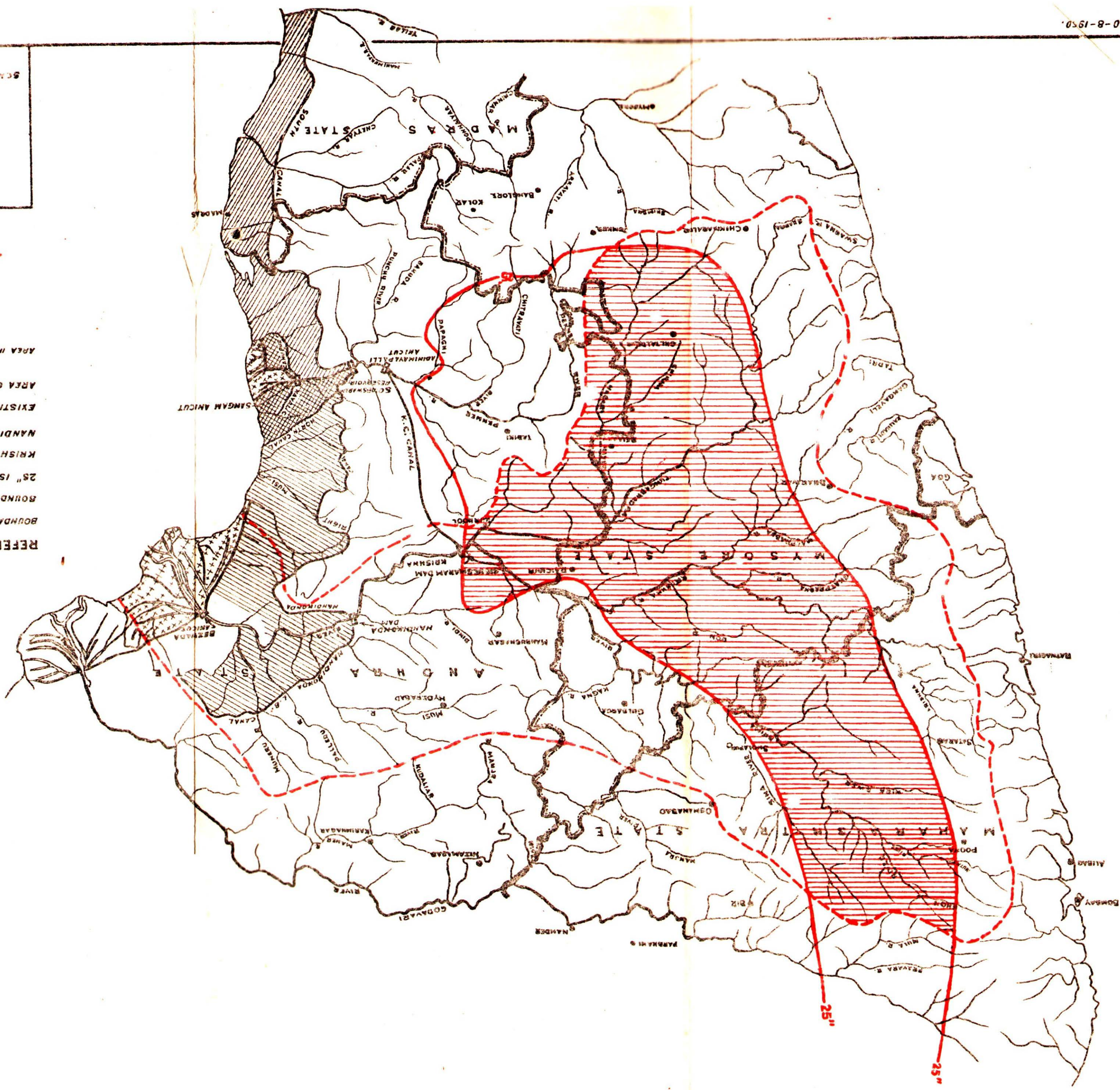




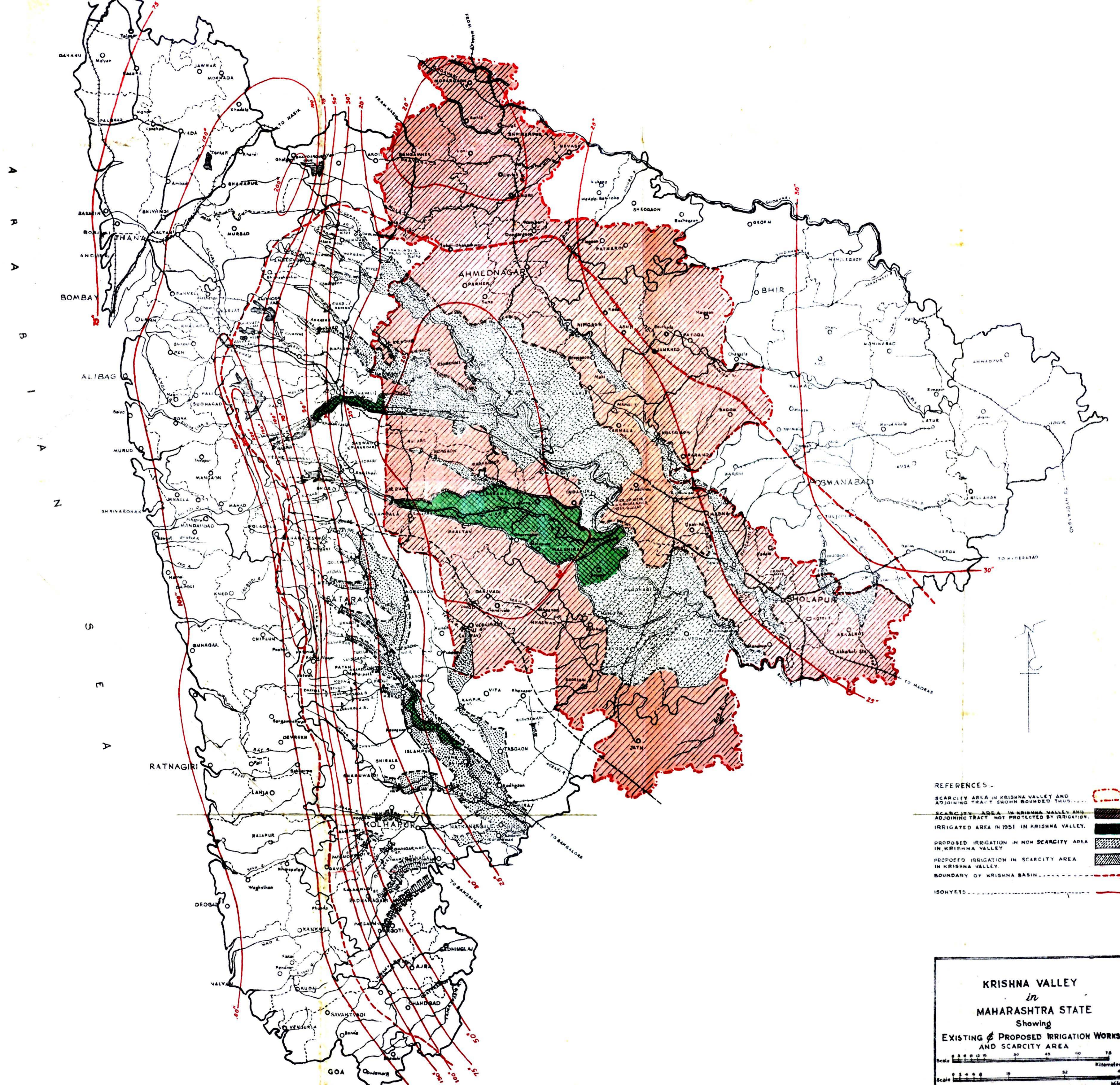
SCALE 0 16 32 64 96 FT.

# KRISHNA BASIN SHOWING STATE BOUNDARIES AND 25" ISOHYETS

- REFERENCES.
- BOUNDARY OF KRISHNA BASIN
  - BOUNDARY OF STATES
  - 25" ISOHYETS
  - KRISHNA PENNER PROJECT
  - NANDIKONDA PROJECT
  - EXISTING IRRIGATION
  - AREA OVERLAPPED BY NANDIKONDA AND KRISHNA PENNER PROJECT
  - AREA IN KRISHNA BASIN HAVING RAINFALL LESS THAN 25"







REFERENCES:-

- SCARCITY AREA IN KRISHNA VALLEY AND ADJOINING TRACT SHOWN BOUNDED THUS
- SCARCITY AREA IN KRISHNA VALLEY AND ADJOINING TRACT NOT PROTECTED BY IRRIGATION
- IRRIGATED AREA IN 1951 IN KRISHNA VALLEY
- PROPOSED IRRIGATION IN NON SCARCITY AREA IN KRISHNA VALLEY
- PROPOSED IRRIGATION IN SCARCITY AREA IN KRISHNA VALLEY
- BOUNDARY OF KRISHNA BASIN
- ISOHYETS

**KRISHNA VALLEY**  
*in*  
**MAHARASHTRA STATE**  
Showing  
**EXISTING & PROPOSED IRRIGATION WORKS**  
**AND SCARCITY AREA**

Scale Kilometers  
Scale Miles