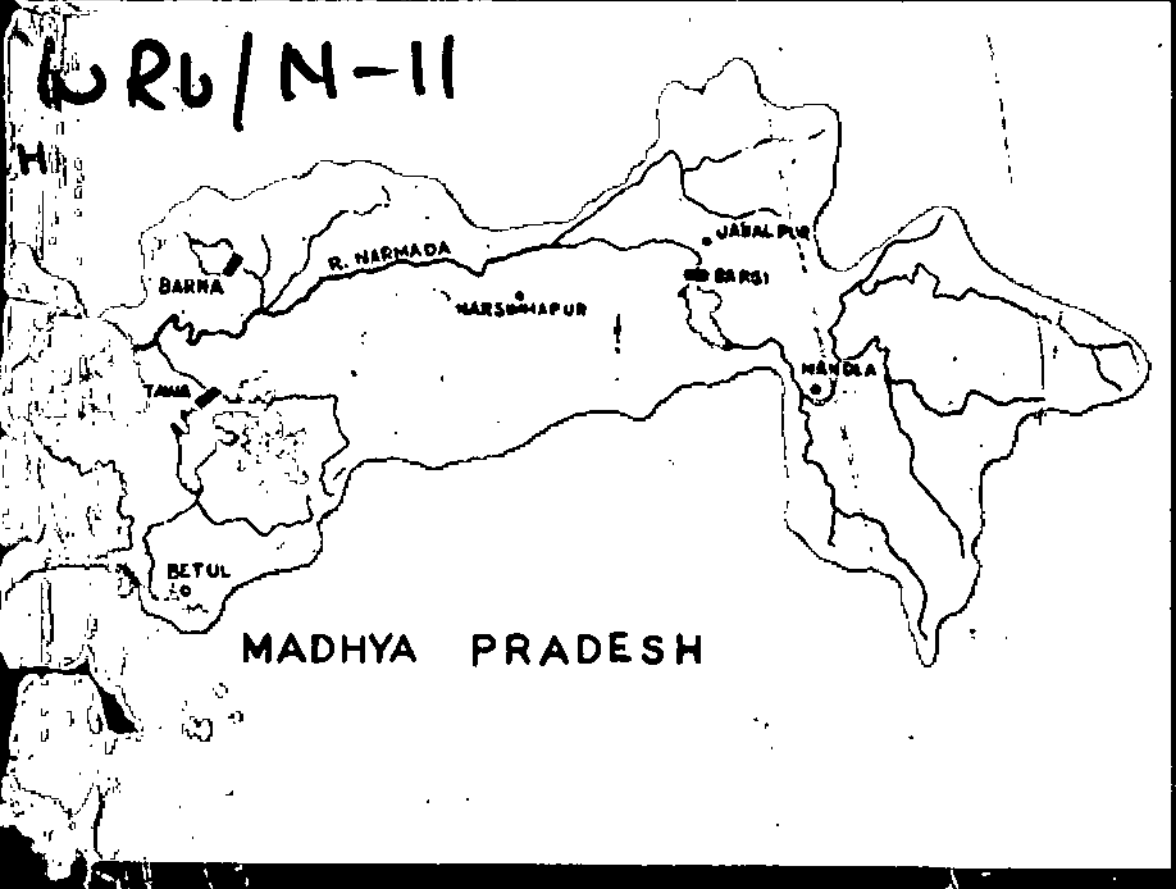
REPORT OF THE NARMADA WATER DISPUTES TRIBUNAL

VOLUME IV



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GOVERNMENT OF INDIA
NARMADA WATER DISPUTES TRIBUNAL

THE REPORT OF THE NARMADA WATER DISPUTES TRIBUNAL

OPINION OF SHRI A. K. SINHA, MEMBER OF THE TRIBUNAL IN THE MATTER OF WATER DISPUTES REGARDING THE INTER-STATE RIVER NARMADA AND THE RIVER VALLEY THEREOF BETWEEN

1. *The State of Gujarat*
2. *The State of Madhya Pradesh*
3. *The State of Maharashtra*
4. *The State of Rajasthan*

VOLUME IV

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THE REPORT OF THE NARMADA WATER DISPUTES TRIBUNAL—OPINION OF SHRI A. K. SINHA, MEMBER OF THE TRIBUNAL

VOLUME IV

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1.1.1 I regret, I could not agree with Learned Chairman on certain points concerning apportionment of water of Narmada river between Madhya Pradesh and Gujarat. Before I take up these points for consideration, I will indicate in brief outline the relevant facts leading to the present dispute.

BRIEF FACTS

1.1.2 Shortly put, the whole dispute centres round Gujarat's proposed project known as Sardar Sarovar Project for construction of a high multi-purpose storage dam at a point almost nearing the border of Gujarat, Madhya Pradesh and Maharashtra on the Narmada river for irrigation, power generation, navigation, flood control, etc. I will not state over again the historical background or the chain of events that led Gujarat to raise the present water dispute concerning sharing of waters of Narmada river. The immediate cause, however, is, as there was disagreement between the States of Madhya Pradesh, Maharashtra and Gujarat on question of sharing of Narmada waters, Government of India constituted in 1964 a Committee of experts, known as "Narmada Water Resources Development Committee" to prepare "a Master Plan for optimum and integrated development of the water resources of the Narmada river for irrigation, power generation, navigation, flood control, etc." This Committee also made State of Rajasthan a party before it.

1.1.3 Thus, Khosla Committee, after examining various plans and projects and the respective demands on Narmada river water, pressed by the four States, with all other connected matters, recommended respective areas for irrigation and water requirements of the four States as follows:—

Areas to be Irrigated and Water Requirements(1)

	Irr. lakh acres	Water allowance MAF
1. MADHYA PRADESH—		
Major Projects	25·00	6·00
Medium Projects	32·00	7·68
Minor Projects	8·00	1·92
Total	65·00	15·60
2. MAHARASHTRA—		
Medium Projects	0·10	0·10
Total	0·10	0·10
3. GUJARAT—		
Major Projects	34·74	8·33
Great Rann of Kutch	4·50	1·08
Mahi command transferred to Navagam canal	6·57	1·58
Total	45·81	10·99
Deduct contribution of Heran and Orsang	—	0·34
Balance	45·81	10·65
4. RAJASTHAN—		
Major Projects	1·00	0·25
Grand Total	111·91	26·60

1.1.4 The Khosla Committee also recommended in favour of Gujarat, among other things, the construction of the above high multi-purpose storage dam (named as Navagam dam in the report) with full reservoir level of +500 and high level canal for irrigation with full supply level of +300(2).

1.1.5 The States of Madhya Pradesh and Maharashtra did not accept the Report, but Gujarat did, though it asserted its right at the same time to get further 3.32 MAF water for irrigation and disputed several other matters determined by the Committee(3). The State of Rajasthan also accepted the Report. The dispute, obviously, did not end there. Thereafter, all the party States agreed to discuss the entire matter jointly in an official level conference. It is not necessary to set out details of the results achieved, except that it could not bring about any final settlement between the party States on the question regarding sharing of water, areas to be irrigated in each State, level of the Navagam dam and canal.

1.1.6 Thereafter, some time in August, 1966, there was again a meeting of the Chief Ministers of the concerned four States with the then Union Minister of Irrigation and Power, but without any result.

1.1.7 Ultimately, Gujarat submitted a complaint to the Government of India in or about the month of July, 1968, for appointment of a Tribunal under the Inter-State Water Disputes Act, 1956, mainly on the ground that Madhya Pradesh and Maharashtra intended to proceed with their power projects at places called, Jalsindhi, Harinphal and Maheshwar to the

(1) G-83, Khosla Committee's Report—p. 217, Table 17.2.
(2) G-83, p. 134.
(3) G-181, comments of Gujarat on Khosla Committee Report, p.4, Annexure-I.

detriment of the Gujarat's above multi-purpose project, (now named as "Sardar Sarovar Dam") and thus deprive Gujarat of its rights to an equitable share in Narmada waters. The State of Gujarat set out the specific matters of dispute in the complaint(1). In substance, Gujarat's plea is that it has legitimate right to raise the proposed terminal storage dam, as recommended by the Khosla Committee with the consequential right of submergence of lands in the States of Madhya Pradesh and Maharashtra, including the sites of the above projects in the States of Madhya Pradesh and Maharashtra. But if these two States could proceed with their proposed Projects in the upper reaches of Narmada at those places, that would operate as an interference with the right of Gujarat and prejudicially affect its interests concerning use, control and distribution of Narmada waters.

1.1.8 The State of Rajasthan also raised dispute and submitted complaint on the ground that it would equally be deprived of utilising its share of Narmada water under its agreement with the State of Gujarat if the States of Madhya Pradesh and Maharashtra would proceed to implement the above power projects.

1.1.9 In 1969, this Tribunal was constituted by a Notification dated 6th October, 1969 of the Central Government and all the four party States, Gujarat, Madhya Pradesh, Maharashtra and Rajasthan appeared and submitted their pleadings in their respective statement of cases, rejoinders, replies etc. altogether in 17 volumes.

1.1.10 Briefly, Gujarat case is that the State of Gujarat intends to provide for irrigation facilities to gross command area of 126 lakh acres for which net consumptive water requirement from Narmada river would be about 22 MAF (now assessed at 20.73 MAF). Gujarat proposes to build a multi-purpose dam as recommended by the Khosla Committee with a further higher full reservoir level of 530 ft. with 10 ft. height for flood moderation, that is, in all 540 ft. for required live storage of 18.32 MAF with a canal off-taking on full supply level of 300 ft. from the proposed dam for effective irrigation of the above areas.

1.1.11 This proposed scheme of Gujarat would confer immense benefits as it will provide for irrigation facilities to as many as 12 districts of Gujarat State which would cover nearly about half of the total scarcity areas in the State as also extension of irrigation facilities to the border districts of Kutch and Banaskantha. The Scheme will provide for substantial quantity of hydro-power generation, flood control, establish effective navigation links and also for drinking water facilities to many towns, cities and villages suffering periodically from water scarcity.

1.1.12 Gujarat's further case is that with the FSL 300 canal it would be possible to integrate the development of some areas covered by a project on the Mahi river known as 'Mahi Right Bank Canal Project' with that of the Narmada and convey to Rajasthan its share of Narmada water by gravity flow for irrigation of some of its border areas of Rajasthan.

1.1.13 Madhya Pradesh opposes the claim of Gujarat. It is said in substance that Gujarat has no right to build such a high dam with the resultant submergence of vast areas in the territory of Madhya Pradesh or claim about 22 MAF Narmada water for irrigation of lands mostly lying in areas beyond the Narmada basin in Gujarat State. On the other hand, the case of Madhya Pradesh is that it requires for its needs for irrigation about 31 MAF of Narmada waters through numerous schemes namely major projects, medium projects, minor schemes, pumping schemes, etc. As such quantity of water may not be available at 75 per cent dependable flow, Madhya Pradesh has reduced its requirement proportionately. But even then it requires in the minimum nearly 24 MAF of Narmada waters for meeting its irrigation needs for culturable command area of nearly about 71 lakh acres. Madhya Pradesh has asserted among other things its right to implement the above power projects within its own territory or jointly with the State of Maharashtra without any interference of Gujarat.

1.1.14 The State of Maharashtra has broadly supported the case of Madhya Pradesh and pressed in particular its own right to implement jointly with Madhya Pradesh State the hydro-power project at Jalsindhi. The further case of Maharashtra is that Gujarat's legitimate water requirement for irrigation is far less than what has been claimed and such requirement for irrigation can be successfully satisfied through a dam with full reservoir level of 210 ft. and with low level canal off-taking at FSL 190.

1.1.15 The State of Rajasthan has supported the case of Gujarat and pressed its demand for its share of Narmada water for irrigating some of its border areas in Rajasthan.

1.1.16 Quite a large number of issues were framed for determination of respective rights of these four States over sharing of Narmada waters and for implementation of their respective projects as proposed for use, control and distribution of Narmada waters. Enormous documents including studies, reports, investigations, citations, etc. were put in by all the party States in support of their respective cases but no oral evidence was adduced by any of the parties.

1.1.17 This Tribunal took up for consideration certain preliminary issues at the instance of some of the party States on the question affecting jurisdiction of the Tribunal and legal rights and status of the State of Rajasthan to raise a dispute concerning Narmada waters. The Tribunal held *inter alia* that the dispute referred to was inter-state water dispute and it had jurisdiction to adjudicate such dispute raised by Gujarat regarding use and control of Narmada waters. On the question as to legal rights and status of State of Rajasthan to raise such a dispute, it took the view that Rajasthan not being a co-riparian State had no such right and the reference

(1) Complaint of Gujarat, Ex.A-1.

made at the instance of Rajasthan by Central Government was invalid.

1.1.18 The State of Rajasthan and Madhya Pradesh preferred appeals to the Supreme Court against this judgement and order of the Tribunal.

1.1.19 In the course of proceedings, thereafter, before this Tribunal, a petition for recording a joint agreement between all the four party states was submitted before this Tribunal and the appeals in the Supreme Court were withdrawn. The agreement provided, *inter alia,* as follow:—

> C1.3 "that the quantity of water in Narmada available for 75 per cent of the years be assessed at 28 million acre feet and that the Tribunal in determining the disputes referred to it do proceed on the basis of that assessment;
>
> C1.4 that the requirements of Maharashtra and Rajasthan for use in their territories are 0.25 and 0.5 million acre feet, respectively and that the Tribunal in determining the disputes referred to it do proceed on the basis that the requirements of Maharashtra for use in its territories are 0.25 million acre feet and that Rajasthan will get for use in its territories 0.5 million acre feet without prejudice to the height of the canal;
>
> C1.5 that the net available quantity of water for use in Madhya Pradesh and Gujarat is 27.25 million acre feet and that the Tribunal in determining the disputes referred to it do proceed on the basis that the net available quantity of water for use in Madhya Pradesh and Gujarat is 27.25 million acre feet;
>
> C1.6 that the Tribunal do allocate this balance of water namely 27.25 million acre feet, between Madhya Pradesh and Gujarat after taking into consideration various contentions and submissions of parties hereto;
>
> C1.7 that the height of Navagam Dam be fixed by the Tribunal after taking into consideration various contentions and submissions of the parties hereto;
>
> C1.8 that the level of the canal be fixed by the Tribunal after taking into consideration various contentions and submissions of the parties hereto;"(1)

1.1.20 By an order dated 8.2.1974 the Tribunal accepted the above agreement and determined the share of Rajasthan and Maharashtra as 0.5 MAF and 0.25 MAF respectively.

1.1.21 I need not record other provisions of the Agreement in detail for my present purpose at the moment. This is how, in short, the question arises as to how and on what basis the distribution of balance quantity of water of 27.25 MAF is to be made between states of Madhya Pradesh and Gujarat. The relevant issue for this purpose is in these terms "How and on what basis should the equitable distribution of 27.25 MAF of water be made between the State of Madhya Pradesh and State of Gujarat? What should be allocation to either State."

1.1.22 For proper and effective decision of the aforesaid issue the following points to which I have referred to earlier are involved:—

(a) Culturable commanded area of Madhya Pradesh and Gujarat.

(b) Water requirements of Madhya Pradesh and Gujarat.

(c) Law and legal principles of equitable apportionment.

(d) Apportionment of 27.25 MAF between Madhya Pradesh and Gujarat.

1.1.23 I will now proceed to consider the above points under Issue No. 6. I will also consider other issues in this connection so far as may be necessary.

1.1.24 At this stage, I should mention that I agree with all matters covered by Chapters 1, 1A, 1B, 1C, 2, 3, 4 of Volume I of the Report and so it is not necessary to restate them.

CULTURABLE COMMANDED AREA OF GUJARAT

Brief History

1.2.1 There is a long history behind the present irrigation schemes of Gujarat. Briefly speaking in or about the year 1956 a site near Gora in Broach was first proposed by the then CW&PC for a construction of weir with full reservoir level 160 in the first stage envisaging an annual irrigation of 4.44 lakh hectares (10.97 lakh acres) with a gross commanded area of 5.38 lakh hectares (13.3 lakh acres) through a right bank canal. In 1959, this project was however, modified and its implementation was envisaged in two stages for commanding a gross area of 9.4 lakh acres.(2)

1.2.2 In the beginning of January, 1960, a panel of Consultants was appointed by the Ministry of Irrigation and Power, Government of India to review the Broach Irrigation Project (Narmada Project). On the recommendation of the said Consultants' Committee the Broach Irrigation Project report was modified and proposed to be implemented at two stages. After the bifurcation of the State of Bombay into two states from 1st May, 1960 the Broach Irrigation Project Stage-I was submitted by Gujarat state and accepted by the Planning Commission. The Stage-I of Broach Irrigation Project provided for construction of a ungated weir with FRL 162 for diverting water into a low lying canal to command 5.38 lakh hectares (13.30 lakh acres) gross in the Broach and Baroda districts. Annual Irrigation of 3.89 lakh hectares (9.63 lakh acres) was envisaged.

(1) Agreement between party States (Ex. C-1).

(2) Ex. G-176.

1.2.3 Stage-II of the said project envisaged the raising of the weir and providing crest gates to afford full reservoir level. Irrigation was proposed to be extended to an additional area of at least 3.64 lakh hectares (9 lakh acres) pending investigations as recommended by the Consultants *inter alia* for extending irrigation in North Gujarat including the little Rann of Kutch by means of a high level canal off-taking full supply level 295.

1.2.4 As the commanded areas surveyed and the reservoir submergence areas surveyed indicated that much larger area could be commanded under +300 canal this project site was shifted to a site called Navagam site No. 3. But this planning created differences between Gujarat and Madhya Pradesh over sharing of Narmada waters.

1.2.5 In 1964 Narmada Water Resources Development Committee was constituted for drawing up a Master Plan for optimum utilisation of Narmada water resources. Before this Committee Gujarat proposed a GCA of 78.64 lakh acres and CCA 50.51 lakh acres.(1) Khosla Committee, however, provided water allowance for 31.74 lakh acres for zones I to XI and also for some areas in little Rann of Kutch, Great Rann of Kutch and for transfer of Mahi Command to Navagam canal.

Gujarat's Case

1.2.6 Gujarat's present claim before the Tribunal for water requirement from Narmada river is based on its needs for irrigation of a vast area covering a part of Broach, Saurashtra and Kutch region near a portion of western border of Pakistan and several other districts of Gujarat attaching a part of the Northern border of the State of Rajasthan as delineated in a map annexed to the Gujarat's pleadings(2). Gujarat has divided these areas into (1) Zones I to XI, (2) Mahi command, to be transferred to Narmada High Level Canal and (3) Kutch areas namely Banni, Great Rann of Kutch (Northern border) Great Rann of Kutch (Eastern border) little Rann of Kutch.

GCA, CA & CCA

1.2.7 Gujarat in its pleadings has in short explained the implications of GCA, CA and CCA(3). It is said that (a) Gross command area is the total area within the extreme limits set for irrigation in a project. (b) CA or culturable area or land available for cultivation in the gross command, (c) Culturable commanded area means the gross command area less such areas as are excluded from the Project by reason of their being unsuitable for irrigation either on account of the nature of the soil or because of the ground being too high to be irrigated by gravity flow.

1.2.8 It is further said that "cultivable area or culturable areas in the command or of lands available for cultivation in the command are not necessarily capable of being irrigated or proposed for irrigation under a Project. Where the CCA is determined Project-wise, the deductions to be made from area available for cultivation in the gross command to determine the CCA depends on the facts relating to each Project. The deductions may comprise *inter alia* local high patches which cannot be reached under a flow canal, parts of cultivable waste which cannot be possibly brought under cultivation except at a very high cost, inferior soils which may have inherent defects as regards some soil criteria, e.g., the impeded drainage, and lands having alternative sources of irrigation, such as ground water. Availability of alternative resources of irrigation in the command of a Project can be accounted for either by deducting area to be irrigated by such alternative resources from CA or by accounting for such alternative resources in determining the water requirements under the project.

Gross Command Area of Gujarat

1.2.9 The gross area of the command of the canal (+300) is estimated in all at 126.26 lakh acres including Mahi command and Banni and Ranns in Kutch. The canal flows through 12 districts. There are 68 Talukas in these 12 districts which are within the command of the canal(4), out of which 26 are wholly within the command and 42 are partly within the command area. As regards the whole area of a district the figures were taken from agricultural statistics of 1964-65 but the part area of a district within the command had to be found by planimetering.

1.2.10 The gross commanded area of zones I to XI excluding Banni and the Ranns but including Mahi command has been estimated as 90.26 lakh acres. On the basis of a subsequent compilation(5) the gross command of the zones I to XI and the Mahi command comes to 91.57 lakh acres. In another compilation this figure comes to 91.56 lakh acres.

1.2.11 As the GCA did not contain any details of land use classification on the basis of which the figures of CA and CCA in the command could be worked out, on the application of Madhya Pradesh(6) and consequential directions given by this Tribunal Gujarat made assessment according to land use classification with details(7) on the basis of records and collected information under different enclosures as follows:—

Enclosure No.	Description
1.	Talukawise breakup of reporting area proposed to be commanded by

(1) G-182 p. 44.
(2) Guj. Statement of Case Vol. 3 Plate GP-5-G-97.
(3) Guj. Statement of Case Vol. 1 p. XII, Items 27-28.
(4) Guj. Statement of Case Vol. I pp. 68-69 para 56.3 G-95, Plate-5. Guj. Statement of Case Vol. III Plate GP-5.
(5) G-425 Annexure III Statement I Annexure IV.
(6) CMP-120/1972.
(7) Ex. G-425.

Navagam canal according to Standard ninefold classification.

2. Talukawise break up of reporting area of 12 districts covered by Navagam canal command.

3. Villagewise land utilisation statistics of Narmada canal command based on District census Handbooks 1971 (excluding Ranns).

4. Districtwise break up of area under forest and barren and unculturable land in Narmada Canal Command.

5. Statement giving districtwise figures of reserved and protected forest area under Narmada canal command.

1.2.12 Gujarat admits that there are some discrepancies in the figures obtained from different sources and villagewise and Talukawise statistics but on a comparative study of these figures the difference that would be there will be minor and is the affect of some variation in planning.

Culturable Area of Gujarat in the Gross Command of Narmada +300.

1.2.13 Cultivable area or culturable area or area available for cultivation (CA) in the Gross Command of Narmada +300 canal.

1.2.14 Gujarat has in its pleadings estimated CA comprising 7.20 lakh acres in the Mahi Command, 2.28 lakh acres in Banni, 8.75 lakh acres in the Ranns and 54.05 lakh acres in area excluding the said three areas. Out of this, however, 10.24 lakh acres as pointed out in Gujarat's S.S.P., Report(1) though cultivable were not proposed to be irrigated and thus excluding Banni and the Ranns the total area of CA in the command would come to 71.49 (54.05+7.20+10.24) lakh acres(2).

1.2.15 It is said that on the basis of enclosure No. 1 the cultivable area in the command excluding Banni and the Ranns would come to 70,57,000 acres, i.e. 70.57 lakh acres as follows:—

	Acres
(i) Miscellaneous tree crops and groves not included in the net area sown (Enclosure No. 1 Column 8B) . . .	6,800
(ii) Culturable waste (Enclosure No. 1, Col. 9B)	3,57,700
(iii) Current fallows (Enclosure No. 1, Col. 10B).	2,54,100
(iv) Other fallows (Enclosure No. 1, Col. 11B)	99,800
(v) Net area sown (Enclosure No. 1, Col. 12B)	63,38,600
Total . . .	70,57,000

1.2.16 In the subsequent compilation culturable(3) area of zones I to XI has been shown at 63,52,700 acres and the area in the Mahi command 7,04,300 in all 70,57,000 acres. In Gujarat's estimate in still later compilation(4) the area in zones I to XI is shown as 63,74,400 acres and area in Mahi Command 7,07,800 acres total 71,62,200 acres.

1.2.17 Gujarat has also shown the areas excluded from culturable areas on the basis of nine fold classification which are as follows(5):—

	Acres
(1) Land put to non agriculture . .	3,49,800
(2) Permanent pastures & other grazing areas	4,17,800
(3) Total forests	4,48,200
(4) Barren and unculturable areas . .	11,42,000
Total . . .	23,58,000

1.2.18 From the above figures it is clear that the gross commanded area of zones I to XI including Mahi Command exceeded by about 4 lakh acres. Gujarat has, however, submitted that the discrepancies between the areas of figures of forests and reported by the Forest Department and those reported by the Revenue Repartment is a common feature in all the States and found not only in Gujarat as will be evident from the observation made in the report of the National Agriculture Commission(6). So, this discrepancy would be reconciled by changing the areas of forest for reconciliation with the figures given by the District Forest Officer and also adjusting area of barren and unculturable land to re-concile the total culturable area. Gujarat has given an estimate of culturable area for 1962-63, 1963-64, 1964-65 and 1968-69 on Talukawise statistics and also on villagewise statistics as follows:—(7).

Sr. No.	Method	Year	Total culturable area in lakh acres	Reference to document
1.	Talukawise statistics	1962-63	69·83	Ex G-715 page 19
2.	Do.	1963-64	70·21	G-716 page 47
3.	Do.	1964-65	70·57	GWS No. 1 page 19
4.	Villagewise statistics	1964-65	71·29	CMP No. 8 of 77, page 11
5.	Do.	1968-69	72·25	G-628, page 19

Gujarat has relied on Talukawise statistics(7) and on that basis culturable area in the command excluding Banni and the Ranns works out to 70.57 lakh acres

(1) G-177, Vol. III pp. 255-256, para 12.4.
(2) G-425 Encl.-I.
(3) G-626.
(4) G-1019.
(5) G-425 Annexure I and Annexure IV.
(6) GWR-8 pp. 42 to 45.
(7) Ex G-626.

Objections of Madhya Pradesh

1.2.19 Madhya Pradesh has raised various objections against the above claim of Gujarat in respect of GCA, CA and CCA under the command of 300 canal. The principal bone of contention of Madhya Pradesh, firstly, is that Gujarat has made enhanced claim from time to time by furnishing different estimates at different times for irrigation needs for the area under the command for proposed 300 canal without any basis or justification. Secondly, on Gujarat's own case that CA and CCA have to be determined on the basis of nine fold classification no reasonable estimate on the basis of materials furnished by Gujarat can be made of CA and CCA of Navagam canal commond(1). Thirdly, Gujarat's scheme for reclamation of some areas in Kutch *viz.* Ranns and Banni is technically unfeasible, unrealistic and otherwise economically not viable. But at the present moment, I am not concerned with this objection.

1.2.20 On the first point Madhya Pradesh State has shown by reference to various compilations of Gujarat, as already noticed, that Gujarat has enhanced its claim from 31.74 lakh acres before the Khosla Committee to 54.05 lakh acres for irrigation of areas under zones I to XI before the present Tribunal.

1.2.21 Gujarat's reply in substance is that these variations in the figures of different assumptions are small and should not be taken into account. Gujarat has also explained its position before the Khosla Committee with regard to the culturable area and the culturable commanded areas as indicated earlier and submitted that in fact estimate of Gujarat's culturable area now made is fair, reasonable.

1.2.22 On the second point Madhya Pradesh has pointed out firstly that Gujarat could not give a fair estimate of its culturable area on the basis of standard nine-fold classification. This is amply demonstrated from the variations from the compilations made on the basis of Talukawise statistics and those on village statistics(2). In support of its contention Madhya Pradesh State has filed from time to time several concise statements(3) showing (i) discrepancies in the number of Talukas, (ii) land utilisation of 12 Talukas newly included, (iii) discrepancies in Annexures I to IV of G-425, (iv) discrepancies in Annexure II of G-425, (v) statement showing variation in total reported areas Annexures II and III of G-425, (vi) showing variations in various areas Annexures II and III of G-425, (vii) showing variations in areas under categories not available for cultivation in Annexures II and III G-425.

1.2.23 Madhya Pradesh has also shown by comparative statement the difference between the Talukawise figures and villagewise statistics concerning several Talukas with regard to some of the categories of nine fold classification *viz.* culturable waste, net area sown, permanent pasture, current fallows etc. and submitted that this could amply demonstrate that variations of more than 10,000 acres is quite common in most of the other Talukas(4). It is, therefore, submitted that Gujarat failed to justify its difference and present precise, definite and reliable case in respect of its culturable areas.

1.2.24 Madhya Pradesh State has pointed out that in Annexure I of G-425 Talukawise figures for only 7 categories of nine-fold classification have been given. The total for these 7 categories works out to 78.246 lakh acres. The total for the other two categories *viz.* waste and barren and unculturable land is given in Annexure IV of G-425 which together works out to 15.902 lakh acres. By adding these figures the GCA of the Navagam including Banni and Ranns works out to 94.148 lakh acres(5). Gujarat's case, however, is that GCA of the Navagam command excluding Ranns and Banni is 90.26 lakh acres. It is also urged that the procedure that has been followed by Gujarat in the compilation of Talukawise land use statistics is wholly arbitrary and is not supported by any principle. By adopting such a method, it is submitted, Gujarat has managed to adjust the discrepancy of 3,88,700 acres without reducing its CA. The argument is that in view of this difference Gujarat's figure of CCA *viz.* 70.57 lakh acres should be reduced proportionately by 2.915 lakh acres excluding Ranns and Banni and this comes to 67.655 lakh acres(6).

1.2.25 Madhya Pradesh has also shown the discrepancies in the total areas of figures of the district as per Settlement Commissioner and the Director of Land Record figure and those arrived at by adding the figure furnished by the Panchayat Department and submits that the difference would be more than 1 lakh acres.

1.2.26 Madhya Pradesh has also shown the discrepancies in various other documents and has submitted that Gujarat's estimate and of culturable area made from time to time are not reliable.

1.2.27 Madhya Pradesh has pointed out that before the Khosla Committee Gujarat's assessment of CA for all the zones inclusive of Little Rann of Kutch was 66.40 lakh acres, deducting the CA of Little Rann of Kutch, the CA for Zones I to XI works out to 60.40 lakh acres (66.40—6.00 lakh acres). Therefore, on the basis of present definition of CA of Gujarat the figures of 60.40 lakh acres for Zones I to XI is liable to be reduced further *viz.*, to 56.64 lakh acres for Zones I to XI. Gujarat has now claimed CA of 63.53 lakh acres and therefore, it is clear that it has increased its CA by more than 7 lakh acres for which there is no justification.

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(1) MP's WS No. 4 pp. 26-27.

(2) G-425, Annexures I, II & IV, G-822.

(3) MP Stat. Nos. 32 to 39.

(4) MP's WS No. 4 pp. 52, 53.

(5) MP's WS No. IV, p. 66, para 10.6 and MP Statement No. 34.

(6) MP's WS No. 4, pp. 69, 70 and MP Statement No. 35.

1.2.28 Gujarat has sought to meet these objections of Madhya Pradesh and denied that it has made increasingly enhanced claim of 70.70 lakh acres for Zones I to XI including Mahi before this Tribunal.

1.2.29 Regarding the discrepancies of various figures as to nine-fold land classification it is said that such discrepancies in figures of areas of forest as reported by the Forest Department and those reported by the Revenue Department is a common feature in all the States and not found only in Gujarat as would be evident from the observation made in the report of the National Commission on Agriculture. As there are some differences and discrepancies in the areas of forest reported by the Panchayat and the Director of Land Record, the areas reported by latter have been preferred. The estimation of CA made by Gujarat on the basis of village-wise statistics for the year 1964-65 works out to 71.29 lakh acres as against 70.57 lakh acres on the basis of Talukawise statistics for the year 1964-65. The Madhya Pradesh's estimate(1) is erroneous and assumes discrepancies even in the categories of current fallows, other fallows and miscellaneous tree crops etc. Gujarat has already explained the method of collection of statistics.(2) Gujarat admits that there are discrepancies but the reporting area given by the Settlement Commissioner and the Director of Land Record is to be preferred and necessarily reconciliation must be affected on the appropriate consideration in the figures reported by the Taluka Panchayats. Gujarat, it is said, has adopted the practice of taking reporting area of taluka given by the Settlement Commissioner as correct, of rounding off the district total of taluka-wise reporting area, of accepting 'forest' area for a district as given by the Chief Conservator of Forests as correct and of reconciling the total area of barren and unculturable land for a district given by the Taluka Panchayats so that the reporting area of the district so derived tallies with the total of 'Forest' area of the district reported by the Chief Conservator of Forests, figures of the remaining seven standard nine-fold classes given by the Taluka Panchayatas and reconciled district figures of barren and unculturable land(3). Gujarat has also explained the effect and implication of Annexure I of G-425(4) and submitted that over estimated area of 3,88,700 acres concerning forest, barren and unculturable land, does not call for reconciliation of the figures of columns 4(B) or 6(B) to 12(B) of Enclosure No. 1 or of any category of land use comprising area available for cultivation in the command. This discrepancy is relevant to estimating cultivable area in the command. In these circumstances Gujarat submits that the cultivable area in the command excluding Banni and Ranns should be worked out on the basis of Enclosure I of G-425 as already noticed earlier and would come to 70.57 lakh acres.

Maharashtra's Objection

1.2.30 Maharashtra has supported Madhya Pradesh. As regards cultivable area the argument of Maharashtra is that Gujarat's cultivable area in the command of Navagam canal as worked out is 70.57 lakh acres which corresponds to GCA 94.148 lakh acres. The percentage of cultivable area to GCA works out as 74.96. Applying this percentage to 90.26 lakh acres the cultivable area is worked out as 67.66 lakh acres. Thus on such percentage basis according to Maharashtra Gujarat's cultivable area should be determined as 67.66 lakh acres.

Gujarat's Case

CCA of Narmada+300 Canal

1.2.31 Gujarat has in its pleadings assessed the total CCA of the canal as 72.20 lakh acres, comprising 7.20 lakh acres in Mahi Command, 2.20 lakh acres in Banni, 8.75 lakh acres in the Ranns and 54.05 lakh acres in areas excluding Mahi Command, Banni and the Ranns. Gujarat's case is that out of the total area, 10.22 lakh acres were not proposed for having irrigation owing to local high patches, cultivable waste etc. as follows:—

3·53 lakh acres	.	Local high patches.
1·99 lakh acres		Parts of cultivable waste.
2·02 lakh acres	.	Inferior soils
0·22 lakh acres	.	Area irrigated by tanks and other sources.
2·46 lakh acres	.	Area irrigated by ground water.
10·22 lakh acres	.	Total

1.2.32 It is said that due allowance by deduction as shown above was made for certain areas which might not in practice be recommended on the basis of detailed planning of canal system or the areas having been inferior soils or reserves for pastures or groves etc. or that areas that would get benefit of underground water(5).

1.2.33 Gujarat in its(*) Sardar Sarovar Project Report, assessed the total CCA at the identical figure, i.e., 72.28 lakh acres with the same break-up as contained in the Table G.T.9 of its pleadings.

1.2.34 Gujarat also set out the details of the assessment of its CCA for the areas other than Banni and the Ranns from which it would appear that CCA in the command including Banni and the Ranns came to 70.94 lakh acres and the CCA excluding Banni and the Ranns was determined at 61.25 lakh acres after making a deduction of 9.69 lakh acres on account of local high patches etc.

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(1) MP Statement No. 35.
(2) GWS No. I, p. 14, para 5.3.
(3) GWS No. I, pp. 13 and 14.
(4) GWS No. I, pp. 14, 15 and 16.
(5) Guj. Written Submission No. 1, pp. 27-28
(*) G-177, Vol. III, pp. 255-257.

1.2.35 Gujarat has made subsequent fresh assessment(1) after deducting the areas on account of local high patches, cultivable waste etc. and thus the CCA of the canal excluding Banni and the Ranns was shown at 60.346 lakh acres as under:—

Sl. No.	Particulars	Before the Khosla Committee		Before this Honourable Tribunal				Remarks
				As per pleadings and Project Reports.		As per Exhibit G-425		
		GCA	CCA	GCA	CCA	GCA	CCA	
1	2	3	4	5	6	7	8	9
1.	Zones I to XI	78·64	31·74*	82.46	54.05	81.36	54·02	
2.	Little Rann of Kutch .	9·00	3·00*	9·00	2·00	9·00	2·00	
3.	Mahi Command .	(7·80)	6·57	7·80	7·20	8·90	6·33	
4.	Banni . ..	..	..	6·40	2·28	6·40	2·28	
5.	Great Rann of Kutch (Northern Border) .	(13·20)	4·50	13·20	4·50	13·20	4·50	
6.	Great Rann of Kutch (Eastern Border) . ..	..	..	7·40	2·25	7·40	2·25	
	Total .	108·64	45·81	126 26	72 28	126·26	71·38	

1.2.36 It would appear from the latest compilation(2) of Gujarat, Gujarat's assessment of CCA for Zones I to XI, Mahi Command (also Banni and Ranns separately shown) are as under:—

As per Ex. G-1019, page 57

		GCA (in lakh acres)	CCA (in lakh acres)
1.	Zones I to XI . . .	81·58	54·12
2.	Mahi Command .	8·94	6·36
3.	Banni	6·40	2·28
4.	Great Rann of Kutch (Northern Border).	29·60	8·75
5.	Great Rann of Kutch (Eastern Border) . . .		
6.	Little Rann of Kutch .		
	Total . . .	126·52	71·51

1.2.37 Gujarat has explained the small variations of the figures of CCA before the Khosla Committee and the figures appearing in this report. It is said that Khosla Committee made specific mention of 'area to be irrigated', 'cultivated area' and 'area proposed to be irrigated' and not CCA. These terms may have near approach to the connotation of CA or CCA as their equivalent. The Khosla Committee recommended irrigation of 45.81 lakh acres every year in Gujarat under the proposed +300 canal which was split up as areas to be irrigated as under:—

		Lakh acres
1.	Areas other than Ranns of Kutch .	31·74
2.	Little Ranns of Kutch	3·00
3.	Great Ranns of Kutch . . .	4·50
4.	Mahi Command transferred to Navagam Canal.	6·57
		45·81

1.2.38 Gujarat's contention is that the Khosla Committee actually proceeded on the footing that the cultivated area would correspond to the connotation CCA and not figures 'area to be irrigated', 'area proposed to be irrigated', as given in the Report. It is said that Khosla Committee treated 74.68 lakh acres as GCA which is now assessed at 81.36 lakh acres which exceed the above figures by only 2.72 lakh acres and this is relatively low and due to minor modifications of canal alignment.

1.2.39 As regards CCA, Gujarat's argument is that 72.08 lakh acres must be deemed to have been recommended by the Khosla Committee(3) but Gujarat has in its fresh assessment before the Tribunal made it 71.38 lakh acres, i.e., 0.70 lakh acres less than recommanded by the Khosla Committee. The reason given by Gujarat is that CCA for Zones I to XI was recommended by the Committee at 50.51 lakh acres whereas Gujarat's fresh assessment for the same zones is laid at 54.02 lakh acres. Gujarat has shown this in a comparative statement, which is reproduced below:—

S. No.	Particulars	Before the Khosla Committee		Before the Hon'ble Tribunal				Remarks
				As per pleadings and Project Report		As per Ex-G-425 and G-626		
		GCA	CCA	GCA	CCA	GCA	CCA	
1.	Zones I to XI	78·64	50·51	82·46	54·05	81·36	54·02	
2.	Little Rann of Kutch	9·00	6·00	9·00	2·00	9·00	2·00	
3.	Mahi Command	N.A.	6·57.	7·80	7·20	8·90	6·33	
4.	Banni .	N.A.		6·40	2·28	7·40	2·28	
5.	Great Rann of Kutch (Northern Border)	N.A.	9·00	13·20	4·50	13·20	4·50	
6.	Great Rann of Kutch .	Not considered	Not considered	7·40	2·25	7·40	2·25	
	Total .	Not available	72·08	126·26	72.28	126·26	71·38	

(1) G-630.

*The extent of areas proposed to be irrigated *viz.* 31.74 and 3.00 lakh acres were arrived at by applying different ad hoc percentages varying from 33.3% to 84% to the cropped areas in the CCA and different zones (vide Ex. G-182, p. 28).

(2) Ex. G-1019, p. 57.

(3) Ex. G-630-A.

1.2.40 It is, therefore, urged by Gujarat that on a study of the comparative figures, the difference that appears, is minor and is the effect of variations in the planning.

Determination of Culturable Area of Gujarat

1.2.41 Before I proceed to determine the Culturable Command Area of Gujarat, the Culturable Area of Gujarat for Zones I to XI (excluding Mahi and Ranns) should be determined. Gujarat has repeatedly stressed that it depends on the Taluka-wise(1) statistics and not village-wise statistics of 1964-65. It appears that Gujarat in its exercise in the above document has shown abstract of gross-command area and culturable area under FSL 300 canal as follows:—

Particulars	Gross Command area	Culturable Area	(Area in 100 acres)
Total of Zones I to XI and Mahi Command	90260	Land under miscellaneous tree crops and groves not included in net area sown	68
		Culturable waste	3577
		Current fallows	2541
		Other fallows	998
		Net area sown	63386
			70570

1.2.42 Out of the above total culturable area of Gujarat for Zones I to XI, excluding Mahi Command, the culturable area as worked out by Gujarat comes to 63.527 lakh acres.

1.2.43 Madhya Pradesh has shown in its last estimate(2), the culturable area of Gujarat as 63.53 lakh acres. So the difference in both the figures is negligible.

1.2.44 Maharashtra has estimated culturable area of Gujarat excluding Mahi Command, as already noticed, as 67.63 lakh acres at a percentage of 74.96 of the GCA 90.26 lakh acres and not on land utilisation statistics.

1.2.45 Madhya Pradesh has raised various objections against the estimates of culturable area of Gujarat. It is said that the method and procedure of collecting land-use statistics of standard nine-fold classification by Gujarat is improper, insufficient and unreliable. None of the forms adduced in evidence in Gujarat's Manual of Revenue accounts in collection of land utilisation and crops statistics at the village, taluka and district levels give a complete picture of the standard nine-fold categories either at village, taluka or district level. On the contrary they give in each of such form, peace-meal information namely, that some of the categories contain standard nine-fold classification, some of them are mixed up and overlapping in all these forms and there are total absence of categories in many of these forms.

1.2.46 I have already discussed other relevant objections of Madhya Pradesh on the question of determination of culturable area of Gujarat. Gujarat has sought to repeal all these objections of Madhya Pradesh mainly on an argument that although there may be some defects in the collection of statistics or some difference in various compilations, relating to assessment of Gujarat's culturable area, it is possible to reconcile these differences and Gujarat, as already noticed, furnished reasonable explanation on these questions. In my view, the explanation(3) should be accepted. But this apart, Madhya Pradesh itself has accepted the figure of 63.53 lakh acres(4) as culturable area of Gujarat. So, it is clear that the difference between the respective figures of Madhya Pradesh and Gujarat appears to be marginal. I, therefore, accept the figures given by Gujarat and determine the CA of Gujarat at 63.52 lakh acres.

Determination of Culturable Command Area of Gujarat

1.2.47 Gujarat's culturable area as indicated above has been determined at 63.527 lakh acres for Zones I to XI.

1.2.48 In view of the serious controversies raised by the rival party States, the question of determination of culturable command area of Gujarat has become rather delicate and difficult. The long gap created between the estimates of the rival party States, viz., Gujarat, Madhya Pradesh and Maharashtra, seems to be unbridgeable. But this is a matter of vital importance for determination of water requirements of Gujarat from Narmada river.

1.2.49 Gujarat in its estimates of CCA for Zones I to XI, has made the following deductions from its culturable area:—

	Lakh acres	Lakh acres
Gujarat's culturable area for Zones I to XI		63·527
Deductions (As per Gujarat)		(—) 9·510
1. Local high patches	3·176	
2. Culturable waste	1·950	
3. Inferior	2.022	
4. Area irrigated by tanks and other sources	0·220	
5. Area irrigated by ground water including future potential	2·142	
Total	9·510	
CCA of Gujarat		54·017

1.2.50 Maharashtra has estimated the culturable command area of Gujarat at 36.89 lakh acres. Out

(1) Ex. G-626 and G-1019.
(2) MP Statement No. 137 (Revised).
(3) Guj. Written Sub. No. 1, pp. 26-27.
(4) MP Statement No. 137 (Revised).

of the culturable area 67.66 lakh acres as estimated by Maharashtra, the following deductions should be made:—

(i) The area of inferior soils which is worked out at 3.86 lakh acres being 9.5 per cent of the culturable area.(1)

(ii) Deduction from CCA for the area irrigated under existing major and medium projects is taken as 8.06 lakh acres.(2)

(iii) A total area of 0.45 lakh acres should be deducted from CCA for the existing areas irrigated by tanks and other sources.(3)

(iv) A total area of 8.70 lakh acres should be deducted from CCA for the existing (1973-74) areas served by ground water.(4)

(v) The total area of 0.93 lakh acres should be deducted from CCA for the areas proposed to be irrigated under medium scheme.(5)

(vi) An area of 3.30 lakh acres should be deducted from CCA for irrigation for future potential of ground water.(6)

(vii) After deducting the above mentioned areas the balance CCA which would be required to be served from Narmada is determined at 36.98 lakh acres.(7)

1.2.51 It will be seen that the deductions claimed by Maharashtra from the cultivable area of Gujarat are almost similar to those claimed by Madhya Pradesh as will appear from the Madhya Pradesh's statement No. 137 (revised).

1.2.52 As against the above, Madhya Pradesh, in its latest estimates has given the following deduction from Gujarat's culturable area as estimated by Madhya Pradesh at 63.53 lakh acres:—

MADHYA PRADESH STATEMENT NO. 137 (REVISED)

(Revised M.P. Statement No. 84)

CCA and Water Requirements of Gujarat according to M.P.

Sl. No.	Particulars	Quantity	Reference
1	2	3	4
1.	GCA excluding Banni and Ranns as the Ranns and Banni areas are not reclaimable	90·26 lakh acres	G/948 page 5.
2.	CA Do.	70·57 lakh acres	Do.
3.	CA excluding Mahi command as the Mahi command is committed to be irrigated (and partly already being irrigated) from the Mahi waters. (See M.P. Written Submission Volume VII pages 80—89 paragraphs 16 to 20 and M.P. Written Reply Volume VII (2), page 14, para (9) (70·57-7·04)	63·53 lakh acres	G/948 page 5.
4.	*Deductions from CA*		
(i)	Over-estimate area due to adjustment $\frac{63·53 \times 2·97}{70·57}$	(—)2·63 lakh acres	M.P. Statement No. 35.
(ii)	Over-estimated area due to misclassification in land records $\frac{63·53 \times 3·97}{70·57}$	(—)3·57 lakh acres	M. P. Written Rejoinder Volume IV, page 83, para 34.
(iii)	Existing area under irrigation by wells, tubewells and by pumping in 1973-74.	(—)8·79 lakh acres	G/795 page 1 Col. 13 (The CA served by existing schemes will be more than 8·79 lakh acres but only the figure of CCA is accounted for).
		(—)14·99 lakh acres.	
(iv)	Existing area under irrigation by medium and minor schemes in 1973-74.	(—)0·94 lakh acres	G/799 page 239, Col. 9.
(v)	Area unsuitable for irrigation e.g., area under land irrigability class V and VI soils (22·60 per cent for LLC and 30·43 per cent for other areas).	(—)18·47 lakh acres	*CA under LLC 11·01 lakh acres—See G/176 I-pp. 47-48.
	LLC 11·01* $\times \frac{22·60}{100·00} = 2·49$		
	Other area (63·53—11·01) $\times \frac{30·43}{100·00} = 15·98$		G/1081, G/1035 percentages given in M·P. statement 135 item IV(a) and IV(c).
		(—)34·40 lakh acres	

(1) MR Note No. VII Sr. No. 6(c).
(2) Do. Sr. No. 8(i).
(3) Do. Sr. No. 8 (ii).
(4) Do. Sr. No. 8 (iii).
(5) Do. Sr. No. 8 (iv).
(6) Do. Sr. No. 8 (v).
(7) Do. Sr. No. 9.

1	2	3	4
		B.F.(—)34.40 lakh acres	
(vi)	Local high patches 5% as assumed by Gujarat (63.53—34.40) × 1/20	(—) 1·46 lakh acres	Actually the percentage of high patches will be more (8%) but 5% is assumed as given by Gujarat (Reference M.P. Written Rejoinder, Vol. IV, page 71).
(vii)	Area under existing and contemplated schemes by surface flow excluding Mahi.	(—)4·59 lakh acres	MP/626, page 33 column 5 excluding Mahi area.
(viii)	Total deduction . . .	(—)40·45 lakh acres	
5.	Balance CCA (63·53—40·45)	23·08 lakh acres.	

1.2.53 Madhya Pradesh has claimed deductions from CA [item 4(i)] over-estimated area due to adjustment an area of 2.63 lakh acres and 3.57 lakh acres [item 4(ii)] on account of over-estimated area due to misclassification in land records. This relates to the difference in various compilations in Guiarat's estimates of GCA, CA and CCA. In view of the explanation, as noticed earlier, given by Gujarat, these two items [4(i) and 4(ii)] cannot be accepted for total deductions from CA of Gujarat as claimed by Madhya Pradesh.

1.2.54 Madhya Pradesh has claimed a deduction of 8.79 lakh acres [item 4(iii)] on account of existing area under irrigation by wells, tubewells and by pumping in 1973-74. Gujarat has made a deduction on this account to the extent of 2.142 lakh acres (item 5 in para 1.2.49).

1.2.55 Now the question is whether an area could be kept separate for irrigation by ground water exclusively, within the command area of flow irrigation by canal. It is said in the Report of the Irrigation Commission(1) that, "surface and ground water resources are inter-linked. Therefore, integrated studies are needed to cover both the resources. So far, the work of the Central Ground Water Board (CGWB) has been confined mainly to the alluvial and semi-consolidated areas, whereas 70 per cent of the total geographical area of the country is covered by hard rock. The CGWB should equip itself to undertake exploratory programmes in the hard rock areas. Even in areas already explored there is need for deeper exploration to evaluate fully the available groundwater potential. We have been informed that under the programme 'Operation Hard Rock' for the exploration of non-ferrous metals whatever data is obtained, no groundwater is passed on to the ETO and GSI for further use. The ETO has undertaken a special project for groundwater assessment in Rajasthan with the assistance of UNDP. We understand that more such studies are to be undertaken in the near future."

1.2.56 The Irrigation Commission has also in its report stressed the need for taking ground water resources into account for preparing river basin plans. It is stated in the Report(2), as follows:—

> "5.38 We have already stressed the need for taking groundwater resources into account while preparing river basin plans. This is particularly desirable where the groundwater supply is ample or where it is expected to improve with the advent of canal irrigation. There are several ways of making combined or conjunctive use of surface and groundwaters. It can take the form of full utilisation of surface water supplies supplemented by groundwater or the direct use of groundwater during periods of low canal supplies or canal closures. It can also take the form of irrigating pockets exclusively with groundwater in a canal command, especially where the terrain is uneven. Planning for combined use of surface and groundwater calls for greater ingenuity than is needed for their separate use. It has to be admitted that so far no projects have been planned on the basis of such combined use of water. Such combined use as is now practised was not pre-planned, but has come into being out of necessity."

1.2.57 In view of the recommendations made by Irrigation Commission, it is right that the area supposed to be irrigated by groundwater should not be excluded from the canal command area for the purpose of irrigation. It is also to be noticed that Madhya Pradesh State has not excluded any area from its command culturable area in any of its projects on account of irrigation by groundwater proposed in its revised Master Plan.(3)

1.2.58 Madhya Pradesh State has then claimed a deduction [item 4(iv)] on account of existing area under irrigation by medium and minor schemes in 1973-74, an area of 0.94 lakh acres. But this is an area included in Chapter VII, Vol. I of the report on alternative resources of Gujarat.

1.2.59 As regards item 4(v), Madhya Pradesh State has claimed deduction on account of "area unsuitable for irrigation e.g., area under land irrigability classes V and VI soils, an area of 18.47 lakh acres". I will consider it along with the item 3 i.e., deductions by Gujarat on account of inferior soils.

1.2.60 As regards item 4(vii), a deduction of 4.59 lakh acres on account of area under existing and

(1) G-512 Vol. I, pages 51-52, para 3·40.

(2) G-512 Vol. I, page 96, para 5·38.

(3) MP-312.

contemplated schemes by surface flow excluding Mahi claimed by Madhya Pradesh, I will consider it at the appropriate place.

The position is, therefore, as under:—

		Lakh acres	
1.	Local high patches .	3·176	
2.	Culturable waste . .	1·950	
3.	Area irrigated by tanks and other resources. (other than Mahi)	1·110	(*See* Chapter VII of the Report)
	Total .	6·236	

1.2.61 The Culturable Command Area, after the above deductions, would come to:—

CA of Gujarat (Zones I to XI)	63·527	
Deduct areas as above .	(—) 6.236	
Balance Area as CCA .	57·291	lakh acres

Deduction of Lands on Account of Inferior Soils as Claimed by Gujarat

1.2.62 Gujarat's case on this aspect is that it 'has carried out scientific soil surveys for the command areas, including the Ranns.' Gujarat has also relied on several studies of the soils of the Ranns of Kutch, Pilot experiments carried out on an experimental farm in Banni and experiments at Ubhrat for heavy soil types (*see* Gujarat's Written Submission No. 1 during the opening page 23, para 5.9). Gujarat has made scientific land irrigability classification of the command excluding Banni and the Ranns, and classified CCA in Banni and the Ranns to be reclaimed into three groups, I, II and III for determining their irrigation water requirements. In making the soil surveys and land irrigability classification, Gujarat was guided by Manual for Pre-Irrigation Soil Surveys, CW&PC (extracts at Ex G-599); Soil Survey Manual, IARI (Ex G-240) and Indian Standard: Guide for Soil Surveys for River Valley Projects, IS: 5510-1969 (Ex G-513). On the basis of the said land irrigability classification of the Command excluding Banni and the Ranns grouping of CCA to be reclaimed in Banni and the Ranns and agro-climatic factors, Gujarat has divided the Command into various zones *viz.*, zones I to XI and Sub-zones of some of them, Mahi command and zones of Banni and the Ranns, with a view to determine realistic cropping patterns and irrigation intensities likely to develop under the proposed irrigation. Gujarat has determined the deltas (water depths required for bringing crops to maturity) separately for each crop or group of crops for zones or sub-zones. On the basis of cropping patterns, irrigation intensities and deltas so determined, Gujarat has worked out its irrigation water requirements of the Command.(1)

1.2.63 Gujarat has carried out Soil Surveys and land irrigability classification for the Command excluding Banni and the Ranns in respect of different areas within the command and at different times as follows:—

(i) In 1952, rapid reconnaissance soil survey was carried out by the then CW&PC of the command of the then proposed Broach Irrigation Project covering 13.3 lakh acres.(2)

(ii) During 1957—59, detailed soil survey was carried out by the then Bombay Government of the then proposed Broach Irrigation Project using a base map to a scale of 1:7920 and a frequency of 4 bores per sq. mile.(3)

(iii) In between the Years 1957—64, detailed soil survey of the Mahi Right Bank Canal Command covering 7.8 lakh acres using base map of 1:7920 with a frequency of 4 bores per sq. mile.(4)

(iv) In between 1963-64 and 1970-71 rapid reconnaissance soil survey of 59.10 lakh acres was carried out by dividing the area into grid squares with a frequency of one bore per 4 sq. miles. The area covered by the soil survey did not include the Command of the Broach Irrigation Project, the Command of the Mahi Right Bank Canal, part of Saurashtra, Banni or the Ranns of Kutch.(5)

(v) In 1970, the remaining commanded areas measuring 10.06 lakh acres mostly comprising residual soil in Saurashtra and Kutch regions were traversed and 22 soil profiles were examined at randum.

1.2.64 On the basis of these Soil Surveys Gujarat adopted the recommendations of the United States, Department of Interior Bureau of Reclamation(6) with necessary modifications and changes to suit local conditions and then divide the area into 5 land irrigability classes.(7) Gujarat also attempted to fix tentative soil series on the basis of 160 auger/open profiles and grouped into land irrigability classes on a very broad basis in Sardar Sarovar Project Report(8) but thereafter pursuant to discussion between the the representatives of Gujarat and Madhya Pradesh

(1) Gujarat Written Submission No. 1-A, pp. 4-5, para 2·2.
(2) Ex G-176, Vol. III-B, pp. 5—108, Appendix 9.
(3) G-171.
(4) G-652, CMP 148/74.
(5) Ex. G-177, Vol. I, SSPR Plate 13·1.
(6) G-577, pp. 1-2, Para 1·2, G-177, Vol. III, p. 263, 13.1.3.2.
(7) Guj. Statement of case Vol. I, p. 73, Table GT-10.
(8) G-177, Vol. III, pp. 264,277, G-577, p. 4 para 3·2.

at the time of inspection of the latter of the soil survey records no weightage was given on the above broad base revised land irrigability classification in Sardar Sarovar Project Report. Gujarat, however, on the data collected during various other soil surveys from 1957 to 1974 revised land irrigability classification on the guidelines set by the soil survey manual and Indian Standard Soil Survey for River Valley Projects.(1)

1.2.65 Subsequently, Gujarat upon its application was allowed by this Tribunal to prepare a fresh land irrigability classification of the command area on the basis of the survey already carried out.

1.2.66 A Summary Report and Abstract of Land Irrigability Appraisal of the Command(2) along with the detailed reports concerning each unit was submitted before this Tribunal showing that out of gross command area of Zones I to XI and Mahi Command of 90.26 lakh acres, 85.04 lakh acres were covered by different soil Surveys leaving 5.22 lakh acres unsurveyed.

1.2.67 In this Report, Annexure XII, Col. 4, gives the total area classified in land irrigability classes and also the total area so classified in each of the three survey units and also the total Bhal area.

1.2.68 In the said Report(2) about Bhal areas, it is stated as under:—

> "8.2.4 Annexure XII column 4 gives the total Bhal area classified in land irrigability classes in each of the said 3 survey units and also the total Bhal area so classified in all the said 3 survey units. It will be seen that of the total area of 4,75,680 acres of Bhal area in the said 3 survey units, it has been possible to classify into land irrigability classes 4,21,920 acres (*i.e.* 88.7 per cent). As stated earlier no grid in this Bhal area has been classified into land irrigability Class I. Columns 6 to 10 of Annexure XII give the extent of Bhal area in each of the said 3 survey units falling in land irrigability Classes 2, 3, 4, 5 and 6 and also the totals for all the 3 survey units."

As regards Kotar area, it is stated as under:—

> "8.4.1 All along the bank of the Mahi, there is a stretch of land of yarying width which contains cut-up land. This area during the course of soil survey was treated as with blank grids and no evaluation for irrigability was done. However, the land can easily be brought under cultivation by suitable soil conservation measures. In fact, quite a sizeable portion of it, is already under crops. In a general soil survey conducted in 1948, under the supervision of Dr. D. G. Kulkarni, it is recorded in the report, submitted by him, that in the Borsad Taluka which comes in the tract in question and in which Kotar lands were found, about 59.60, say 60 per cent, of the Kotar land of the gross command in the taluka was considered suitable for irrigation (*vide* Statement No. 16, page 198 of the report Ex G-350 Vol. I). There is a total of 18,880 acres constituting the Kotars of the Mahi in Survey Unit No. 5 out of which, a total of 11,360 acres, being 60 per cent of 18,880 acres, can be considered suitable to take irrigation."

1.2.69 The above Report has also shown the land irrigability Class 5 and Class 6 and Category 'unsuitable' as follows:—

	Area of pooled L.I. Class and Suitability categories		
	14 survey units	LLC	Command
L.I. Class 5	4,89,920	2,60,418	7,50,338
LI. Class 6	2,55,520		
Category US	2,57,280	Nil	
Identified US	79,520		
	5,92,320		5,92,320

1.2.70 From the above Table, Class 5, Class 6 and category Unsuitable for irrigation excluding Mahi will be as under:—

1.	Class 5	7·288 lakh acres
2.	Class 6	2·485 lakh acres
3.	Unsuitable for irrigation	2·573 lakh acres
	Total	12·346 lakh acres

1.2.71 Madhya Pradesh has strongly disputed the correctness of this fresh land irrigability appraisal. Both Madhya Pradesh and Maharashtra State also has disputed the methodology of working out land categories for rating suitable/unsuitable for irrigation. This methodology, it is said, is clearly unwarranted and not permitted in any of the principles according to Indian Standards. Madhya Pradesh has also given its own classification showing Class 6 lands as the highest in the land irrigability Classes I to VI.

1.2.72 I, however, find that Prof. Ambika Singh, Assessor (Agronomist) in his Report, dated 15.10.1977(3) after examining this land irrigability classification for Zones I to XI, has recommended, for reasons given, for its acceptance. Prof. Ambika Singh, as appears, proceeded to determine other matters contained in his report, on accepting 54,434 lakh acres CCA, as proposed by Gujarat.

1.2.73 It, however, appears that Gujarat itself has claimed a deduction of 2.02 lakh acres as 'Inferior Soils' in the computation of its total CCA. Madhya Pradesh State, as noticed, claimed deduction of 20.30 lakh acres (30.43 per cent) on account of Class 5 and Class 6 soils.

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(1) Ex. G-240 and G-513.

(2) Ex. G-1081.

(3) Ex. C-5.

1.2.74 According to the definition and explanation of the land irrigability class given in the Soil Survey Manual (Revised Edition), 1970,(1) class 6 lands 'are not suitable for sustained use under irrigation. The lands of this class do not meet the minimum requirements for lands of other classes, or are not susceptible to delivery of irrigation water.' Therefore, class 6 lands, as shown in the Land Irrigability Classification, should be totally excluded.

1.2.75 'Unsuitability' categorisation is equivalent to class 6 land. Therefore, the lands under the category 'Unsuitable' should also be totally excluded.

1.2.76 According to the same Soil Survey Manual, with regard to class 5 land, it is stated as under:—

> "Lands that are temporarily classed as not suitable for sustained use under irrigation pending further investigation.
>
> Lands of this class cannot be classified at the present level of investigations, and are temporarily classed as not suitable for irrigation. If these lands are to be given a final classification special investigations will be needed."

1.2.77 Gujarat wanted a deduction as already said of 2.02 lakh acres as 'inferior soils'. But the terms 'inferior soils' are not found in the Soil Survey Manual. In the ordinary sense, unless otherwise defined, this will, to my mind, include both class 5 and class 6 soils. But class 5 soils are not unsuitable for irrigation. What is required is that further investigation has to be made to be given final classification. In such a situation, it may well be that in future some portion of it can come under class 6. The question, therefore, is what really would be the fair and proper percentage of class 5 lands, which may turn out to be not suitable for sustained use under irrigation.

1.2.78 In the Summary Report(2), it is stated as follows:—

> "It will be seen that of the area which could be classified into land irrigability classes, 76.32 per cent falls in land irrigability classes, 1 to 4 and would be irrigable without any necessity of reclamatory or ameliorative measures, whereas 17.66 per cent falls in land irrigability class 5 and would be irrigable with appropriate ameliorative or reclamatory measures. Thus, in all, 93.98 per cent would be irrigable. It will further be seen that only 6.02 per cent is classifiable as land irrigability class 6, which would be considered as non-irrigable subject to exception considered in paragraph 8.1.1".

1.2.79 It is stated in the same Report(3) again as follows:—

> "It would be appropriate at this point to say something about the land that has been classified into land irrigability class 6 or categorised or identified as unsuitable to take irrigation in evaluations referred to above, Annexure XI hereto gives in Column 7 areas in each survey unit which have predominantly sand texture and which have for that reason been classified as land irrigability class 6 or categorised as unsuitable to take irrigation. In accordance with the USBR Manual, soils with sand as the texture of the surface layer lying on predominantly sandy sub-soil upto effective soil depth, are considered non-irrigable and for that reason land occupied by such soils is placed in land irrigability class 6 or is categorised as unsuitable to take irrigation."

1.2.80 It is stated, however, that in India, "predominantly sandy soils are being adopted for framing patterns that use crops with low water requirements and successful irrigated farming in such areas has been possible. Example for the needed cropping patterns can be found in the pattern in which groundnut comes into rotations with other crops. Gujarat happens to be one of the largest groundnut producing States of India and usefully some of these sandy soils, which have to be considered technically non-irrigable on the particular specifications of the USBR Manual, can form excellent soils for irrigated groundnut and the crops that follow it in sequence."(4)

1.2.81 In any case, as appears, according to this Report, no part of classified land should be considered as non-irrigable. But as I have already indicated that class 6 lands and un-irrigable category should be excluded as non-irrigable. It is quite possible that some part of class 5 lands may turn out to be non-irrigable in spite of adoption of ameliorative measures. The percentage given by Madhya Pradesh State appears to be too high. In the facts and circumstances revealed, I consider a deduction of 15 per cent of class 5 lands would be proper and reasonable.

The position, therefore, is as under:—

		Lakh acres
CA of Gujarat (Zones I to XI)		63.527
Deduct		
(Deductions already made on account of local high patches etc.)		6·236
	Balance	57·291
	Lakh acres	
Deduct on account of		
(a) Class 6 soils	2·485	
(b) Area classified as 'Unsuitable'	2·573	
(c) Area to be excluded from class 5 lands at 15% (7·287×15)/100	1·093	
		(—)6·151"
	Balance	51,140

1.2.82 Gujarat and Madhya Pradesh put in estimates on account of the areas to be covered by irrigation channels and other development works for the

(1) Ex. G-240.

(2) Ex. G-1081, p. 26, para 7·1·3.

(3) *ibid.*, page 30, para 8·1·1.

(4) Ex. G-1081, p. 30, para 8·1·2·

SSPR Project. According to Gujarat estimates(1) percentage of the area works out to 2.6 per cent which comes to 1.340 lakh acres. If this area is deducted from the above CCA, then the balance CCA would come to 49.800 lakh acres. But on an overall consideration, I will make it a round figure of 50.00 lakh acres. Accordingly I determine Gujarat's CCA for Zones I to XI at 50.00 lakh acres.

1.2.83 Gujarat has not claimed pastures and grazing lands for inclusion in its CCA. On the other hand, Gujarat has opposed Madhya Pradesh State, its claim for inclusion of pastures etc. on the ground that no pasture lands can be included in the CCA for crop cultivation by irrigation in the proposed CCA of Madhya Pradesh in all its projects, Accordingly, I have not considered any portion of pastures and grazing lands for inclusion in Gujarat's CCA.

1.2.84 It is to be noted that out of the areas of CCA proposed to be irrigated by Gujarat, the area proposed to be irrigated by lift without use of Gujarat's device for drop and lift for crossing the depression, would be about 4.477 lakh acres, (*See* Annexure I).

Annexure I

Estimate of Culturable Lift Areas

Saurashtra Branch

CCA, CA and GCA of areas above gravity canal, in Zones XI-A, XI-B(i) and XI-B(ii) have been indicated in G-783, page 8, as below, in lakh acres:—

Zones	GCA	CA	CCA
XI-A . . .	3·19	2·27	2·46
XI-B(i) . . .	2·00	1·54	1·42
XI-B(ii) . . .	1·06	0·82	0·74
Urban Area . . .	0·36	..	..
	6·61	5·13	4·62

	Lakh acres
Adopting basic feature of CA as .	5·130
1. Deductions for items excluded by Gujarat on pro-rata basis : $5·13X \frac{6·236}{63·527}$ =	(—)0·504
	4·626
2 Deduction of lands unsuitable for irrigation @ 15% would be marginal .	..
3. Deduction for canals and other development works @ 2·6%	(—) 0·149
	4·477

CCA for Ranns & Banni

1.2.85 At this stage, I will consider Gujarat's CCA for Ranns and Banni. Guparat's case for Ranns and Banni area, which have been included in CCA of Gujarat, in brief, is that there are extensive lands lying unutilised in the District of Kutch owing to various land, soil and environmental factors. Some of these areas comprise Banni and the Great and the Little Rann of Kutch.

1.2.86 In the Pleadings(2), Gujarat has given the details of Gross Command Area and Culturable Command Areas as follows:—

Situation	Command Areas in Lakh Hectares (Lakh acres)			
	Gross		Culturable	
Area excluding Mahi Command, Banni and Ranns	33·38	(82·46)	21·90	(54·05)
Mahi Command .	3·16	(7·80)	2·91	(7·20)
The Banni	2·59	(6·40)	0·92	(2·28)
The Ranns .	11·98	(29·60)	3·54	(8·75)
Total	51.11	(126.26)	29.27	(72.28)

1.2.87 Gujarat's case is that although the areas are barren and uncultivated due to excessive concentration of soluble salts in the soils, without proper land drainage and also due to extreme acidity of climatic conditions adverse to the productivity of the soil, it is possible to reclaim these lands with Narmada waters and to introduce crop cultivation.

1.2.88 Gujarat has estimated the areas proposed for reclamation and their extent in its subsequent compilations(3), which are as follows:—

Location	Area (Lakh acres)
1. Banni	2·28
2. *Great Rann*	
(i) Northern Border. . .	4·50
(ii) Eastern Border .	2·25
3. Little Rann	2·00
	11·03

1.2.89 It is stated that the areas to be irrigated in the Banni and the Ranns have not been determined on the basis of the total CA in the Command but only selected areas as shown above are proposed for irrigation suitability of the soils in Banni and the Ranns, for reclamation has been established.

Studies, Experiments and Soil Surveys for the Banni and the Ranns

1.2.90 Gujarat states that it has carried out scientific Soil Surveys and other Studies and Experiments as follows:—

1.2.91 Gujarat has in its Written Submission No. 1 during the opening of its case (page 23, para 5.9) mentioned several documents on the basis of which suitability of the soils for reclamation in Banni and the Ranns has been established.

(1) Ex. G-1024 to G-1027 G-1037 & 1038.

(2) Guj. Statement of Case Vol. I, page 69.

(3) G-1175, p. 2. Appendix I.

Ex G-170-Studies on the Soil of Ranns of Kutch by K. V. S. Satyanarayana of IARI, New Delhi, 1950, *pp.* 8, 25, 26.

1.2.92 On the basis of surveys made in 1947, the author concluded that 1,000 square miles (6.4 lakh acres) of the Banni and 1,900 square miles (12.16 lakh acres) in the two Ranns flooded by river waters appeared to be more suitable for reclamation and required a closer examination.

Ex G-207-Soils of Kutch and Rann and their better utilisation by K. V. S. Satyanarayana, IARI, 1954, *pp.* 1, 8-11

1.2.93 On the basis of a very rapid survey of Kutch main land and Rann done in 1947 and reconnaissance soil survey of tracts in eastern parts of Kutch Main Land and Little Rann done in 1951, the author estimated that above 2,000 square miles chiefly flooded by river waters and 1,000 square miles occupied by scrub-vegetation and grasses *i.e.*, Banni could be reclaimed.

Ex G-67-Soil Survey of Little Rann, 1962-64.

1.2.94 The Government of Gujarat carried out rapid reconnaissance soil survey of 1,474 square miles (9 lakh acres) being the total area of the Little Rann. 81, Soil profiles with a grid of 2 miles were selected and examined to a depth of 8 ft. and 729 soil samples were tested for their physico-chemical properties. Tests included mechanical analysis, salinity, alkalinity (pH), lime status and permeability.

Ex G.68-Soil Survey in the Great Rann, 1965-66

1.2.95 Government of Gujarat carried out a reconnaissance soil survey of 2.34 lakh acres of Banni in the Great Rann. The survey covered one-third area of Banni. Statements, 1, 2 and 3 of the Report give detailed results relating to the physico-chemical characteristics of soil.

Ex G-208-Reclamation of Little Rann of Kutch—Final Report of Soils and Land Utilisation Survey of Little Rann of Kutch By Dr. Satyanarayana, 1955, *page* 34 *Para VIII and Page* 37, *Para X.* 44

1.2.96 The author concluded that it is possible to reclaim soils in Little Rann of Kutch provided the encroachment of 3 lakh acres could be immediately tackled for reclamation, that the rest of the area may require costly measures, that once the land is reclaimed local crops like Bajra and Cotton could be grown under rain-fed conditions and that when irrigation facilities are provided paddy may also be grown in some areas.

Ex G-349-Report of the Dutch Team (Prof. Dr. H. Vlugter & Ors.) of the FAO (UN) submitted to the Government of India, 4-5 *pp.*

1.2.97 This team investigated at the request of the Government of India the possibility of reclaiming the saline soils of the Little Rann of Kutch. Its conclusions *Inter alia,* were that the reclamation and irrigation of the Rann cannot be carried out with water from the surrounding catchment areas, that the necessary water can only be supplied from the proposed Narmada multi-purpose project, that the area primarily to be reclaimed is the central part covering 1.35 lakh hectares (3.33 lakh acres) or about one-third of the total Rann, that it is not necessary for a successful reclamation to prevent ingress of the tide, that sill and valvular gates in the Highway Bridge at Surajbari are not needed and that for the study of desalinisation possibility three experimental fields of about 5 hectares each must be constructed and exploited during at least 2 years and if positive results were achieved a pilot project about 400 hectares (1,000 acres) can be constructed for research of the civil engineering and agricultural aspects of the reclamation.

Ex G-168-Reclamation and Development of Great Rann of Kutch—A Report By Khemchandani Committee of Government of India, November, 1966, *pp. VIII to XIII, Para* 31 *to* 50.

1.2.98 The Committee came to the conclusion that the preliminary investigations and survey suggest that from technical standpoint there is possibility for reclamation and development of the Rann and Banni areas for agricultural, forest and pasture purposes and for manufacture of potassium fertilizer and recommended *inter alia* pilot studies for determining the economic feasibility of reclamation.

Ex G-173—A Note

Ex G-177/7, Page 261, *Annexure* 13.1

1.2.99 This note deals with the pilot experiments carried out by Gujarat on a plot of 12 acres in Banni area and the results of the experiments Ex L-177/12 Sr. No. 25 plate 13.1.1 gives lay out of the pilot plot. The experiments were in the 'light to medium type soil' (Bhitara and Tutki series) which constitute about 80 per cent of Banni. These experiments establish feasibility of reclamation of these soils.

Ex G-389/2—A Note

1.2.100 The remaining 20 per cent of Banni is 'heavy soil type' (Dhori Group). The heavy soil type in Banni area being away from the source of sweet water, experiments for these types of soils are being carried out at Ubhrat. The experiments at Ubhrat relate to drainage and reclamation measures required for coastal salines in the medium to heavy type of soils. These experiments establish feasibility of reclamation of heavy soil types.

Ex G-177/3, pp. 280—282, *Para* 13.2.5

1.2.101 Brief description of the soil surveys carried out in Banni and the Ranns is given. As stated in paragraph 2.3.1 hereof Madhya Pradesh took inspection of the relevant soil survey data on 8th and 9th November, 1974 and as prayed for by Madhya Pradesh by its CMP No. 148 of 1974, Gujarat has filed documents Exs. G-649 to G-651, Exs. G-665, 666 and 681 which give maps and statements giving locations of soil sites and results of tests carried out on the

soil samples collected during soil surveys to determine physical and chemical properties of the soils.

Ex G-177/3, pp. 282—289, Paras 13.2.6 to 13.2.9

1.2.102 On the basis of examination, of various geomorphological characteristics and variations in soil texture, structure, colour, lime content, water table level etc. three soil series Bhitara, Tutki and Dhori have been tentatively identified to the extent indicated in the table below:—

Location	Extent of area of each soil series in the surveyed area			
	Bhitara	Tutki	Dhori	Total
	in lakh acres			
1 Banni area .	3·96	2.58	1·06	7.60
2 *Great Rann of Kutch*				
(a) Northern Border	1·44	2·79	1·74	5.97
(b) Eastern Fringe .	0·52	0·88	1·69	3.09
3 Little Rann of Kutch . .	0·80	0·50	1·70	3.00
Total .	6·72	6·75	6·19	19.66

Ex G-177/10, Plate 1311 is a map showing location and extent of the different soils series in Banni and the Ranns.

1.2.103 On the basis of various soil characteristics, the area in Banni and the Ranns have been classified under three major groups as under:—

Location	Percent area in various groups		
	I	II	III
1 Banni . . .	65·60	24·80	9·60
2 *Great Rann*			
(a) Northern Border .	75·20	14·90	9·90
(b) Eastern fringe .	5 70	42·70	51·60
3 Little Rann . . .	61·75	25.35	12.90

1.2.104 The Group I has medium to light texture in the surface (sandy loam to clay loam) followed by similar structure in the sub-surface. Soils of Group I are internally well-drained and are expected to be profusely productive after reclamation. Soils in Group II have light to heavy texture (sandy loam to clay) in the surface followed by light to medium texture (loamy sand to clay loam) in the sub-surface. Group II soils are also internally well drained, but in the low lying patches, where heavy texture soils are under lain by clay loam texture in the sub-surface, some ameliorative measures may be required during reclamation. Presence in adequate quantities of gypsum crystals in the profile found in these soils would prove useful for reclamation. Soils of Group III have heavy texture in the surface (clay to sandy clay), followed by coarse texture (sand to loamy sand), in the sub-surface. Group III soils can be reclaimed rapidly and brought under normal crop.

1.2.105 The State of Madhya Pradesh has raised various objections(1) against such proposals of Gujarat for reclamation of any portion of the areas of Ranns and Banni and in particular against the areas proposed to be reclaimed and introducing irrigated agriculture in any of the proposed areas of Banni or Great and Little Rann of Kutch.

1.2.106 The broad contention of Madhya Pradesh State firstly is that the several studies and investigations and experiments so far carried out and relied on by Gujarat do not establish feasibility of reclamation. At best they only recommend for further experiments, investigations and research, which Gujarat failed to carry out.

1.2.107 Secondly, land irrigability classification carried out by Gujarat in respect of proposed areas in Ranns and Banni are totally inadequate, improper and insufficient and, in any case, they do not establish feasibility of reclamation and crop cultivation.

1.2.108 Thirdly, even assuming that reclamation is feasible, than also it will not be techno-economically viable.

1.2.109 The State of Maharashtra (2) has also supported Madhya Pradesh and maintained that "investigations carried out so far and the data available upto this date in connection with the reclamation of areas in Ranns and Banni for irrigation is hopelessly inadequate to establish the techno-economic feasibility of reclamation of these areas."

1.2.110 I am unable to uphold the objections of Madhya Pradesh and Maharashtra. Firstly because, in the investigation reports relied on by Gujarat, a feasibility of reclamation in these areas have not been ruled out. On the contrary, it appears, in most of the Reports, the conclusion is that such reclamation and crop cultivation in these areas as proposed by Gujarat is feasible. Secondly because, the pilot experiments carried out in Banni, though comparatively in a small area in Banni, has established the feasibility of reclamation and crop cultivation. It may be that Gujarat has not carried out further investigations and research in accordance with the recommendations made in some of these reports, but it has not been possible for Gujarat to carry out further experiments and investigations on account of paucity of waters. Thirdly because, it is too early to say conclusively that such reclamation or crop cultivation in these areas will not be techno-economically viable. According to Gujarat costs will not be prohibitive(3). This, however, at best, is a disputed question at the present moment and cannot be solved only on the basis of certain formulas of cost-economic study. Prof. Ambika Singh, Assessor (Agronomist) in his report (4) dated 15.10.1977, as I find, has not drawn any firm conclusion. In his opinion more investigations

(1) Ex. MP Written Submission No. VI, Parts A & B.
(2) Maharashtra Note No. III, p. 49.
(3) G-1175, pp. 135-147.
(4) Ex. C-S.

and research are necessary before feasibility of reclamation of these areas can be said to have been conclusively established. He agrees that the 'pilot plots in Banni area on light soils of Banni have, no doubt, shown the possibility of growing crops', but he says, that, 'they have not investigated and generated data from which design parameters for effective reclamation of the area could be derived'. Again he says, 'even if it is assumed for argument that the area could be reclaimed and developed with the quantity of water indicated, the return of investment will be prohibitive for undertaking such a venture'. He has shown by calculation that with such quantity of water as claimed by Gujarat, more than 3 lakh acres of good land could be irrigated within or outside the basin which will generate more yield per acre of land. But as I have indicated this question of cost economics cannot be decided at this stage.

1.2.111 It is observed by the Irrigation Commission Report (1972)(1) as follows:—

> "Wherever we went, and at whatever meetings were held, we were made keenly aware of the strong conviction of the people, that any significant improvement in the irrigation picture of Gujarat, particularly of the scarcity areas in Saurashtra, Kutch and North Gujarat, can only be brought about by irrigation from the Narmada."

The Banni Area of Kutch:(2)

> "4.40 All the land in this essentially pasture land belongs to the Government, and the Maldharis, a pastoral people who inhabit the area and raise fine herds of cattle, enjoy unrestricted grazing rights. We were told that there were as many as 13 Maldhari clans living in more than forty villages, which have seasonal sources of water for drinking by human beings and herds of cattle. Our visit to the area took place in a year when the rains had been exceptionally good, and it was possible, therefore, to see more grass than is usually found in the area. The quality of grass was enough to give an idea that the soil was good and of what would happen when the area received irrigation water. If some source of irrigation could be found, the possibilities for growing crops and raising cattle would be immense. We felt greatly distressed to hear from the spokesmen of the Maldharis, of the dire distress caused to them, and of the decimation of their herds when, as frequently happens, the rains fail. Then the Maldharis have no option but to migrate hundreds of Km outside Banni to save their cattle."

1.2.112 Gujarat has again relied on the observations of National Commission of Agriculture(3) as under:

> "15.3.3 It would also be possible to bring under cultivation some desert areas by providing irrigation facilities there as is being done in Rajasthan with Rajasthan Canal...."

1.2.113 Gujarat has also submitted a Fresh Land Irrigability Appraisal(4) of Banni area to show that the feasibility of reclamation and crop cultivation there has been established. Madhya Pradesh State has disputed the correctness of the study and in substance submitted that such studies were inadequate and in any event do not establish the feasibility of reclamation.

1.2.114 For the reasons already given, it cannot be said that reclamation in these areas is not possible. Even assuming that reclamation of these areas as proposed by Gujarat is still in an experimental stage, that itself will, in my view, establish the socio-economic need of Gujarat State for taking Narmada waters to these places. Gujarat has shown that there is no other source of water in these areas either for reclamation or even for carrying out experiments, if necessary.

1.2.115 Khosla Committee(5) also included 4.50 lakh acres in the Great Ranns of Kutch within the areas allowed to be irrigated by Gujarat.

1.2.116 It is also relevant to consider that Gujarat has to take its high level canal right upto the border of Rajasthan. Therefore, from the planning point of view, this will be an additional advantage for taking water to the Ranns and Banni areas without additional costs.

1.2.117 Therefore, in the facts and circumstances revealed on this aspect of the matter, I am of the opinion that some area in Banni and the Ranns should be included within the total CCA of Gujarat.

1.2.118 As already indicated, the break-up areas of Ranns and Banni are as follows:—

Location	Area (Lakh acres)
1. Banni	2·28
2. Great Rann	
(i) Northern Border	4·50
(ii) Eastern Border	2·25
3. Little Rann	2·00
	11·03

1.2.119 As it will not be possible to reclaim all the areas of Ranns and Banni due to paucity of waters, I determine the following areas in the Ranns and Banni to be included within the CCA of Gujarat:—

1. Banni	2·28	lakh acres
2. Little Ranns	2·00	lakh acres
Total	4·28	lakh acres

(1) G-512. Vol. II, P. 110, para 4.39.
(2) Ex. G-512, Vol. II, page 111.
(3) Guj. Written Reply Vol. 8, page 36, G-1021—Extracts from the report of NAC Vol. V. pp. 8-9.
(4) G-1175—Appendix I.
(5) Ex. G-83, page 217.

1.2.120 The position, therefore, is as under:

CCA for Zones I to XI	.	50·00 lakh acres
CCA for Ranns & Banni	.	4·28 lakh acres
Total CCA of Gujarat	.	54·28 lakh acres

Mahi Command

1.2.121 Gujarat has also asked for irrigation of CCA of 6.36 lakh acres in Mahi Command by transferring this area for irrigation by the proposed high level canal (FSL 300). This is a matter concerning water requirements and I shall consider that under the 'Water Requirements head', hereafter.

CULTURABLE COMMANDED AREA OF MADHYA PRADESH STATE

Brief Outline

1.3.1 Briefly the case of M.P. State as appears from its pleadings is as follows:—

1.3.2 M.P. State is largest State in India but economically perhaps the most backward. Both per capita income, the income of the State are much lower than Gujarat which is less than half the size of M.P. State. The census report of 1961 would show that about 86 per cent of the population of M.P. State live in villages and almost 80 per cent of the total workers are engaged in cultivation but the area irrigated in the State compared with the area sown in 1964-65 was the lowest of all the States in the country, namely 6.5 per cent, exactly 1/3rd of National average of 19.5 per cent and less than 1/7th of that of Punjab and Haryana.

1.3.3 About 144 lakh acres of agriculture land lie in the Narmada basin in M.P. out of which about 89 lakh acres are actually under cultivation. The total irrigation from all sources—medium irrigation scheme, small tanks, wells etc.—does not exceed 2 lakh acres. The Narmada basin in M.P. has thus a very low intensity of irrigation.

1.3.4 According to current estimates, 72 lakh people live in the Narmada basin in M.P. and of these more than 36 per cent i.e. about 26.5 lakhs belong to scheduled tribes and scheduled castes, whose economic condition, according to Directive Principles of Constitution, must have to be improved.

1.3.5 There are two other scarcity areas adjoining the Narmada basin at the upper end of the Mahanadi valley in the Durg and Bilaspur districts and about 7 lakh acres in the Son and Tons basins in the districts of Jabalpur, Rewa and Satna where economic conditions are even worse than those in the Narmada basin where Narmada waters are required to be diverted for irrigation of about 5 lakh acres as no other adequate source of water supply is available.(1).

1.3.6 There was lack of irrigation development from Narmada in M.P. during earlier period due to various reasons. But after the introduction of short duration crops and multiple cropping during the Planning Commission's Fourth Five Year Plan, Government of M.P. has been making all out efforts to improve the economic conditions of the people of the State framing various schemes exploiting the available waters from the flowing rivers of M.P. including Narmada and other sources both for irrigation and Hydel Power generation wherever possible. M.P. State prepared a Master Plan, in outline, for developments from the Narmada water in March, 1965(2) and produced before Khosla Committee. In this Master Plan, M.P. made an estimate of culturable area and areas to be irrigated as follows:—

Probable extent of Areas to be irrigated in the First Instance

(All figures are in thousands of acres)

Name of Zone	Culturable area	Areas to be provided with irrigation facilities
Upper hilly areas . . .	2,152	1,000
Upper plains . . .	5,979	3,500
Lower plains . . .	4,384	3,000
Lower hilly areas . . .	307	250
Total . . .	12,822	7,750

1.3.7 M.P. State has submitted a revised Master Plan(3) before this Tribunal aiming at optimum development of water resources of Narmada Basin in M.P. State. The main objectives to be served are:—

(i) Provision of water requirement of domestic and industrial use.

(ii) Irrigation facilities to all culturable area of the basin through major, medium, minor and pumping schemes.

(iii) Hydro power generation.

(iv) Flood control etc.

1.3.8 The gross area of Narmada Basin of M.P. State on the basis of land utilisation statistics for 1964-65 are as under:(4)

Particulars of areas	Thousand hectares	Thousand acres
Gross area (Col. 21) . . .	8,593	21,235
Area under forests not available for cultivation (Col. 10+Col. 17+Col. 20) .	2,120	5,238
Other areas not available for cultivation (Col. 11+12+13+14) . . .	651	1,610
Total cultivable area (Col. 22) .	5,822	14,387
Net area sown (Col. 23) . . .	3,368	8,323
Area irrigated	84	207

(1) M. P. Statement of Case, Vol. IV, pp. 49, 50.

(2) MP-74 (Produced before the Khosla Committee).

(3) MP-312, Vol. I to VII.

(4) MP-312, Vol. I, p. 145, Table 8.1,
MP-312, Vol. II, pp. 18 to 25, Statement 8.8.

1.3.9 M.P. State has also given the figures of the area available for cultivation in reporting areas (i.e. areas as per village papers) under various columns such as net area sown, fallows unoccupied areas and groves and pastures other culturable areas and 50 per cent of the area under water in unoccupied (unsettled areas). The areas not available for cultivation also has been shown(1) with zone-wise and district-wise details.

Narmada Basin in M.P. State

1.3.10 The area of the Narmada basin in Madhya Pradesh is 212.4 lakh acres. Madhya Pradesh has made an estimate of culturable area of 128.22 lakh acres in 1965 in the outline Master Plan (2) on the percentage basis without any reference to land record department as there was very little time to present the schemes of Madhya Pradesh before the Khosla Committee.(3) But the land use statistics for Narmada basin was given on the basis of nine-fold classification which has been put in also before this Tribunal. M.P. State by way of 'Further and Better Particulars' (Vol. 17, page 54 Annexure 13) showed an estimate of culturable area as 143.87 lakh acres. M.P. State has also put in a fresh appraisal 1968 as asked for by Gujarat comparing the figures based on village-wise statistics for 1964-65 and also revised statement of 1970:—

Revised assessement of March, 1970 in note 3(a) (pp. 16 to 22) of Madhya Pradesh Document, Vol. IV (MP-142) filed in June, 1971

		Lakh acres
I.	*Area within holdings* :	
	(i) net cropped area	80·11
	(ii) current fallow	3·37
	(iii) old fallow of 2 to 5 years	5·51
	(iv) other fallows over 5 years	15·56
	Total	104·55
II.	*Area outside holdings* :	
	(i) net cropped area outside holdings	1·28
	(ii) orchards & groves	0·02
	(iii) scrub, jungle and grass	12.48
	(iv) big tree forest	31.39
	(v) area under water	5.50
	(vi) abadi	0.82
	(vii) roads & buildings etc.	1.97
	(viii) hills and rocks	10·56
		64·02
	Grand Total	168·57

Out of the total reporting area of 168.57 lakh acres in the Narmada basin Madhya Pradesh under the Revised Assessment of March, 1970 worked out the total cultivable area at 133.66 lakh acres as per the following details:—

			Lakh acres
I.	*Total culturable area* :		
1.	Net area sown		
	(i) Within holdings	80·11	
	(ii) Outside holdings	1·28	
			81·3
2.	Fallow lands		
	(i) Current fallow	3·37	
	(ii) Fallow from 2 to 5 years	5·51	
	(iii) Fallow for more than 5 years	15·56	
			24·44
3.	Pastures and groves		12·50
4.	Culturable area in forest included in patwari papers		12·58
5.	50% area under water rivers, Nalas, Ponds, Tanks etc.		2·75
			133.66
II.	*Not available for cultivation* :		
1.	Area under forest included in patwari papers		18·81
2.	Abadi		0·82
3.	Roads and buildings		1·97
4.	Hills and rocks		10·56
5.	50% area under water (river, nalas, ponds, tanks etc.)		2·75
	Total area not available for cultivation		34·91
	Total reporting area (I and II)		168·57

Area from reserved and protected forests treated as cultivable under the revised assessment of March, 1970, has been specified in note 3(b) on pp. 23—25 of Madhya Pradesh Documents, Vol. IV as under:—

1·84 lakh acres	Sown area in the forest villages and reserved forests.
3·84 lakh acres	Unsown cultivable areas and forest villages (R.F.) and cultivable areas in the reserved forests, proposed for excision in future.
4·53 lakh acres	Area of protected forests which have either been excised or will be excised for cultivation.
10·21 lakh acres	+ 133·66 = 143·87

M.P. State has put in the revised Master Plan based on village-wise statistics and the geographical area of the Narmada basin was planimetered from topographical maps on a scale of 1" to 4 miles.

1.3.11 Gujarat has not disputed the geographical area of 212.4 lakh acres in Narmada basin in M.P. which covers 56 tahsils of 20 districts some of them falling partly within the basin. The reporting area 168.6 lakh acres and the non-reporting area 43.8 lakh acres. M.P. State has also given detailed information of the villages distributed over these 20 districts and given details as to how these figures were calculated on village-wise statistics. M.P. asserts that all the relevant original village-wise data were produced before Gujarat for inspection and given all necessary information to show how the present statistics were calculated and compiled.(4)

(1) MP-312, Vol. II, pp. 18 to 25, Statement 8.2.
(2) MP-74.
(3) CMP 49/1971.
(4) MP WS No. I, p. 16.

Zones

1.3.12 Madhya Pradesh states that a river basin can be divided into zones on the basis of various factors such as:—

(a) Topography — hilly areas, plains etc.

(b) Rainfall distribution and/or depressions/storms;

(c) Navigation;

(d) Availability of water and water planning with reference to flows recorded at gauging/discharge sites.

1.3.13 M.P. State thus divided Narmada basin into 4 zones in the outline Master Plan purely on the basis of topography.(1) In the revised Master Plan, however, the Narmada basin in M.P. has been divided into 3 zones only on the basis of catchments and sub-catchments relating to availability of water and water planning.(2) This was not done with any ulterior motive as it would appear that in the revised Master Plan, M.P. State has reduced CCA to 70.70 lakh acres from 77.50 lakh acres before the Khosla Committee. CW&PC divided the Narmada basin into 4 zones purely on the basis of topography and not for the purpose of achieving any particular object. M.P. State has also divided the Narmada basin into 3 zones on the basis of rainfall distribution over the basin in association with the day-to-day movements of various bay depressions/storms which has been adopted from the study of Shri Rao and others of (3) IMD. It is pointed out that CWPC also has divided Narmada river into 5 reaches both on the basis of topography and navigation. However, the proper basis for making zones would be to demarcate the natural unit of the river basin together with its tributaries from the point of view of availability of water and water planning. As pointed out in the report of the Irrigation Commission — 1972 a river basin or in the case of large river a sub basin is a natural and suitable unit for planning of water resources which is to be relied to a definite area or region. M.P. State has accordingly followed the directions of Irrigation Commission in its revised Master Plan in dividing Narmada river into 3 zones as follows:—

(a) The Upper Zone—Upto Bargi, sub-catchments 1 to 4.

(b) The Middle Zone—from Bargi to Narmadasagar, sub-catchments 5 to 15 and

(c) The Lower Zone—below Narmadasagar, sub-catchments 16 to 21 and parts of sub-catchments 22, 23 and 24 (Page 51 para 3.12).

Even in Outline Master Plan the different stages for actual water use are indicated as Bargi, Tawa, Narmadasagar and Jalsindhi and the Khosla Committee also laid stress in dividing the zones for water planning and noted that right storage capacity in M.P. are obtainable only at Bargi, Narmadasagar and Harinphal.(4) M.P. State, in support of its contention, has relied on certain papers(5) and argued that it has rightly adopted 3 zones for availability of water and water planning following the pattern which emerged out of its outline Master(6) Plan. M.P. State submits that there can be no question of ulterior motive in dividing the Narmada basin into 3 zones as under the revised Master Plan it has claimed water for CCA of 70.70 lakh acres instead of 77.80 lakh acres claimed earlier.

Method of Collecting Land Statistics

1.3.14 The case of M.P. State on this aspect is that till 1952-53 the land utilisation statistics were collected in the five fold form(7). In 1953-54 the nine fold system was introduced on the account of the recommendations of the Central Government.(8) In 1964-65 the Government of M.P. decided to reintroduce the five fold classification which was necessary for the internal administration of the State as the nine fold classification was causing confusion in the matter of occupied and unoccupied areas. It is said that from this time onwards the statistics were being collected both in five fold and nine fold at village level.(9) It is pointed out that actual collection of statistics at the village level both in the five fold and nine fold forms is made after local enquiry and actual inspection(10) and the method is explained in several statements(11) put in by M.P. State. M.P. thus asserts that it has given "complete statistics on the basis of which total culturable areas and other areas are arrived at" in both five fold and nine fold classifications.(12) The total culturable area is 145.12 lakh acres as against the estimate of 143.87 lakh acres according to the five fold classification and, therefore, M.P. State has no special advantage by not adopting the nine fold classification.

Pastures and Grazing Lands whether Culturable

1.3.15 M.P. has included pasture and grazing lands as culturable area as, according to the M.P., Land

(1) MP-74 Vol. I Chapter 2 p. 5 para 2.
(2) MP-312 Vol. I. pp. 49-51 para 3.11 and 3.12.
(3) MP-515 pp. 53-54 para 5.2 and 5.4.
(4) G-83 p. 156 para 1.2.
(5) G-639 certain observations made in a book entitled Applied Hydrology by R.K. Linsley and others.
(6) MP WS Vol. I pp. 29, 30.
(7) CMP 88/1974 Annexure-4.
(8) CMP 88/1974 Annexure-6.
(9) CMP 88/1974 Annexure-1.
(10) MP-256, MP Land Record Manual Vol. I pp. 32 to 43.
(11) MP Statements Nos. 8 to 11.
(12) CMP 88/1974 Statement 2 Annexure 3 pp. 35, 36 MP-369 to MP-711.

Revenue Code(1)—1959, there is no prohibition for cultivating pastures in unoccupied areas (Outside holdings). In occupied areas (within holdings) pastures can be brought under cultivation at any time by the holder and about 6.21 lakh acres are under pastures and grazing lands in such occupied areas.(2) It is said pasture lands are not only considered as available for cultivation but general tendency is to cultivate them. In support of its case it has relied on a number of exhibited documents enumerated in its written submission.(3) Gujarat though contending that pastures and grazing lands are not available for cultivation has actually treated and shown grass growing lands as cultivated lands or sown area.(4) It is pointed out that none of the documents relied on by Gujarat in aid of its contention really support Gujarat.(5) M.P. State thus has shown the extent of 'pastures and groves' as 1,33,527 acres of the total CCA of 30,99,000 acres in major projects(6) which in terms of percentage would constitute 4.31 per cent of the total CCA. Applying this percentage to the entire CCA 70.70 lakh acres in the Narmada basin in M.P., the extent of such pastures and groves included in CCA of 70.70 lakh acres would come to 3.04 lakh acres(7) only. M.P. State has also shown other lands within the command category-wise besides the figures of pastures and groves.(8)

Culturable Waste

1.3.16 M.P. State has shown culturable waste in 3 categories A, B and C respectively for the purpose of allotment. It is also pointed out that 'C' category of land from culturable waste would be available for cultivation as there is no such distinction in "Guide to current Agricultural statistics"(9) between uneconomical wastes and others. In its break-up statements of cultivable waste,(10) M.P. has shown total culturable waste of three categories as 10,56,476 acres out of which 2,01,539 acres fall in category 'C'. In this connection, it is pointed out that Gujarat itself does not make any distinction between uneconomical small patches and other categories of cultivable forests. Gujarat has included in its CCA areas which admittedly require reclamation even though possibility of their reclamation has not yet been established.

Forests

1.3.17 The case of M.P. State is that out of total area of 212.35 lakh acres on Narmada basin in M.P. State the total forest area is 75.17 lakh acres. This is divided into three categories as follows:—

Categories	Area in lakh acres
(a) Reserved Forests	44·78
(b) Protected Forests.	25·98
(c) Revenue village Forests . . .	4·41
Total . . .	75·17

1.3.18 In M.P. State forest areas are further classified into those falling into 'reporting areas' and those outside 'reporting areas'. The forest area recorded in the patwaris papers are classified as forests in reporting areas and others as forests in non-reporting areas. Those, recorded in the patwari paper is called 'Big Tree Forest' which are divided into above three categories.(11)

1.3.19 As per revised assessment of March, 1970 'Big Tree Forest' in reporting areas, as per patwari papers, works out to 31.39 lakh acres out of total reporting area of 168.57 lakh acres and under reserved and protected forest in non-reporting areas works out to 43.78 lakh acres *i.e.* in all 75.17 lakh acres.

1.3.20 Out of 75.17 lakh acres under forest, the culturable area is estimated at 22.79 lakh acres as under:—

			Lakh acres
I. Culturable area from forests in reporting areas *i.e.* recorded as 'Big Tree Forest' in patwari papers (*See* page 20, MP-142) . . .			12·58
II. Culturable area from forests in non-reporting areas (*See* page 23, MP-142).			
(i) sown area in forest villages in reserved forests	1·84		
(ii) Cultivable area in forest villages in reserved forests .	3·84		
(iii) Cultivable area in protected forest .	4·53	10·21	10·21
			22·79

Thus it appears that out of total culturable area of 22.79 lakh acres, 1.84 lakh acres is the area actually cultivated and as regards the balance of 20.95 lakh acres, 12.58 lakh acres comes from forest in reporting areas (Big Tree Forest), 3.84 lakh acres from re-

(1) MP-431 pp. 269-271.
(2) MP-711 Col. 7.
(3) MP WS No. 1 pp. 37 to 40.
(4) MP WS 1 pp. 41 to 45.
(5) MP WS 1 pp. 43 to 47.
(6) MP Statement No. 14.
(7) MP Statement No. 15.
(8) MP Statements Nos. 14 & 15.
(9) G-233.
(10) MP-365.
(11) MP WS No. 1 pp. 54, 55.

served forest and 4.53 lakh acres from protected forest.

1.3.21 M.P. has stated that assessment of culturable area of forests in reporting areas was done by the method of eye appraisement by the patwari while compiling the khasra.(1) The certificate for this culturable area was also given by the Director of Land Records and all the relevant files in this connection were produced for inspection by Gujarat and Rajasthan.

1.3.22 Out of the culturable area of 10.21 lakh acres in non-reporting areas, 1.84 lakh acres represents actually cultivated area in forest villages and the balance of 8.37 lakh acres constitutes culturable area in the reserved and protected forests certified by the Chief Conservator of Forests, M.P. State,(2) after inspection of the spot by the officers of the forest department. All the relevant files pertaining to such district-wise culturable areas were inspected also by the officers of Gujarat and Rajasthan and all information as asked for by Gujarat (3) was furnished by M.P. State as far as possible.(4) M.P. State has also relied upon a number of documents in support of its case that forest areas can be, in fact, often reclaimed and cultivated.(5)

Area Under Water

1.3.23 M.P. State has included some area under water to the extent of 5.50 lakhs as culturable area(6) on the ground that these areas which form bed to some village tanks become available for cultivation when the tanks are dried up in December. M.P. State has taken into account only 50 per cent out of the above total area *i.e.* 2.75 lakh acres for including the such area on *ad-hoc* basis (7) M.P. State has also shown that area under water leased out for the cultivation is estimated at 4,681 acres, but taking into account the unauthorised cultivation the total figure would come to 8,019(8) acres. M.P. State also submits that these types of lands are leased out according to the guidelines indicated and established practice of this country.(9)

Gujarat's Objections

1.3.24 Gujarat's first and foremost objection is that since irrigation has to be provided by means of projects (Major, Medium and Minor) in M.P. State, "it is not possibe to realistically assess irrigation water requirements without first ascertaining technical feasibility and economic viability of such projects, their size and scope and this will depend upon various surveys and investigations including canal alignment surveys and command area surveys for correct delineation of GCA and assessment of CCA". Gujarat's case is that there was no proper survey or surveys and investigations of all these projects and, therefore, it will be impossible to make any realistic assessment of GCA and CCA or water requirements of M.P. on any project-wise basis.(10) I will consider these objections while dealing with 'Projects of M.P.'.

1.3.25 Gujarat's next objection, substantially, is that in determining the culturable area; M.P. State has failed to follow the standard nine fold land use classification prescribed by the Government of India, (11) where culturable area or land available for cultivation comprises:—

(i) Miscellaneous tree crops and groves not included in the net area sown,

(ii) Culturable waste excluding uneconomic small patches or large blocks of land which are not reclaimable for cultivation at a reasonable cost,

(iii) Current fallows,

(iv) Other fallows (2 to 5 years),

(v) Net area sown.

Firstly, it is said that none of the three estimates of culturable area namely in the (i) outline Master Plan based on land use statistics for the year 1962-63 for 128.22 lakh acres, (ii) the estimates under fresh appraisal of March, 1968 for 178.99 lakh acres and the (iii) revised assessment of March, 1970 for 168.57 lakh acres both based on land use statistics for the year 1964-65 are in term of standard nine fold land use classification. According to the figures given by M.P., Gujarat states that the total culturable area in the Narmada basin in M.P. for the purpose of planning of irrigation would be as follows:—

Standard nine fold class	Area in lakh acres
Misc. tree crops and groves not included in the area sown	0·15
Culturable waste excluding uneconomic small patches or large blocks not reclaimable for cultivation at a reasonable cost	8·54
Current fallows	3·37
Other fallows (2 years to 5 years)	5·51
Net area sown	81·39
Sown area in the forest villages and reserve forests	1.84
Total	100·80(12)

(1) MP-256 Vol. I p. 38 M. P. Land Record Manual.
(2) MP-142 pp. 23 and 27.
(3) CMP 168/1971.
(4) MP-341 (i), (ii) (vi) and MP-342, MP-343.
(5) MPWS Vol. I pp. 66, 67.
(6) MP-142 p. 18-20.
(7) MP-221 p. 4, MP-312 Vol. I p. 144.
(8) MP-329 (i) and MP 342 p. 6.
(9) MP WS No. I pp. 71 to 74.
(10) Guj. WS Vol. 2 pp. 7 to 12
(11) G-233.
(12) GWS No. 2 pp. 17, 18.

1.3.26 In support of the above figures, Gujarat states that M.P. State has itself admitted that the calculations made on the basis of percentage of the area of particular tehsil were rough and the Majmuli maps on which the boundaries were demarcated were not preserved.(1) M.P. itself has not relied upon this estimate. The Khosla Committee's report determining the CA of MP State in Narmada basin based on the above outline Master Plan cannot be accepted.

1.3.27 Fresh appraisal of March, 1968(2) determining the CA as 143.87 lakh acres in Narmada Basin in M.P. though based on land use statistics for the year 1964-65 is also not relied upon by M.P. State.(3) As regards the revised assessment of March, 1970,(4) based on village-wise computation for land use statistics for the year 1964-65 with the same estimate of 143.87 lakh acres of total cultivable area in the Narmada basin in M.P., it is said that the classification is not according to the standard nine-fold classification form and in any case there is no justification for including in its estimates of cultivable area considerable extent of lands from revenue forests, from reserved forests, from protected forests and from lands under water.(5) It is again admitted in the affidavit that no soil survey was conducted to determine the culturable area in the forests.(6) Secondly, Gujarat stated that the area said to be fit for cultivation in reserved and protected forest have been increased from 1.20 lakh acres to 8.37 lakh acres. The(7) figure given by M.P. of 3,84,000 acres from the reserved forests of unsown areas of forest villages and areas proposed for excision in future and 4,53,000 acres in forests either already excised or to be excised for cultivation cannot be accepted for variety of reasons given by Gujarat.(8) Further the areas said to be cultivable in the reserved forests and protected forests also are included in the patwari papers with the result that same area has been shown twice both in the Land Record Department and the Forest Department *i.e.* reporting and non-reporting areas. According to Gujarat, the area in the forest villages and reserved forest of M.P. State would only come to 1.84 lakh acres. Gujarat has also disputed the inclusion of 12.58 lakh acres of Revenue village forest reporting area for cultivation with irrigation facilities. It is urged that these areas are classified as culturable only on 'eye appraisement' by the Patwaris, which is wholly improper and without any justification and observations relied on by M.P. has no application to such cases as it refers only to the assessment of areas under different crops in land within holdings which are surveyed and measured but no such survey as admitted in the affidavit by M.P. was made.(9)

Pastures and Grazing Lands

1.3.28 As regards pastures and grazing lands, Gujarat has relied on several observations or opinions embodied in several exhibited documents in support of its contention that pastures and grazing lands cannot be included in cultivable or culturable area for irrigation purposes.(10) Gujarat has also dealt with the documents relied on by M.P. in this connection and tried to show that they were not relevant or at any rate must be distinguished on the facts of the present case.(11) On the contrary, Gujarat has cited certain passage from the report of the National Commission on Agriculture(12) and in support of its submission that in M.P. State there is deficiency of grazing land which sought to be made up by promoting grazing in various areas.

1.3.29 As regards Gujarat's own case regarding inclusion of grazing lands with the GCA of Narmada command, Gujarat's submission among others are that such inclusion was on the basis of cropped area under Zones I to XI which did not include(13) pastures and further the area under grass are treated as grass crop for which occupant chooses to pay assessment and made the grass grow. Thus Gujarat has not included pastures in determining the cultivable area.(14)

Culturable Waste

1.3.30 As regards the culturable waste Gujarat's submission is, an area of 2.02 lakh acres which falls within class (C) of culturable waste should be excluded from culturable area. The decision of the Supreme Court, it is submitted, in Shri Athmanathaswami Devasthanam v/s V. K. Gopalswami Aiyengar (1964) 3 S.C.R. 763 has no bearing to the questions in controversy in the present proceedings before this Tribunal.

1.3.31 As regards area under water Gujarat submits that not a single acre out of 2.75 lakh acres said to be cultivable out of the area under water is shown

(1) CMP 49/1971.
(2) Gujarat's Statement No. 3.
(3) Gujarat's WS No. 2 p. 20.
(4) Gujarat's Statement No. 4 in its opening MP-142.
(5) Guj. WS No. 2 pp. 21, 22.
(6) Guj. WS No. 2 p. 24.
(7) MP-142.
(8) Guj. WS No. 2 pp. 28 to 32.
(9) Guj. WS No. 2 pp. 23, 24.
(10) MP WS No. 1 pp. 44 to 47.
(11) GWR No. 5 Vol. I pp. 37 to 47.
(12) Part 5 to 17 G-1021 p. 9.
(13) Guj. WS No. 5 Vol. I p. 60.
(14) GWR No. 5 Vol. I p. 19.

to have been cultivated at any time; that apart, if any such area is to be cultivated it would hardly be done by irrigation.(1)

1.3.32 In the circumstances revealed, Gujarat states that the realistic assessment of cultivable area in the Narmada basin in M.P. must be taken as 1,00,80,000 acres on the basis of the standard nine fold classification and thus the revised assessment of March, 1970(2) is not acceptable.

1.3.33 The position according to the estimate of M.P. and Gujarat appear as under:—

Estimate of culturable areas as given by M.P. and Gujarat

(A)

The total area of the basin in Madhya Pradesh is 212·35 lakh acres.

1. Reporting area . . .	168·57 lakh acres
2. Non-reporting area . .	43·78 lakh acres
Total . . .	212·35 lakh acres

1.3.34 The break up of culturable area and area not available for cultivation is given below:

	Culturable area	Area not available for cultivation	Total
Reporting area .	133·66	34·91	168·57
Non reporting area . .	10·21	33·57	43·78
Total in basin .	143·87	68·48	212·35 lakh acres

(B)

		Lakh acres		
		As given by MP	As given by Gujarat	
1. Net sown area .		81·39	81·39	
2. Fallow lands—				
(a) Current fallows	3·37		3·37	Misc. Trees Crops & Groves.
(b) Fallows 2—5 years	5·51		5·51	
(c) Fallows more than 5 years	15·56		8·69	
	24·44	24·44	17·57	
3. Pastures & groves .		12·50	Nil	
4. Culturable area of forests in revenue village . . .		12·58	Nil	
5. Area under water .		2·75	Nil	
Culturable area from reporting area.		133·66		
6. (a) Sown area in reserved and protected forests . . .		1·84	1·84	
(b) Area excised or proposed to be excised from forests.		8·37	Nil	
Culturable area from non-reporting area .		10·21		
Total culturable area .		143·87	100·80	

Projects of Madhya Pradesh

1.3.35 Substantially the case of Madhya Pradesh State for requirement of water is based on irrigation of its culturable area. For feasibility of irrigation schemes of culturable area in different parts of the Narmada basin or beyond the basin Madhya Pradesh has from time to time prepared quite a large number of projects major, medium and minor. The total number of major projects with some modification from time to time as it now stands is 24.

1.3.36 It is said that brief history of major projects is that an *ad hoc* Committee was set up by the Government of India in 1948 which drew attention to the great "potential of development" in Narmada valley for irrigation, generation of power "Navigation from river's out fall in the sea right upto and beyond Hoshangabad, *i.e.* almost to the heart of the country" as also for flood control. At the first instance it recommended investigation for Bargi, Tawa and Punasa and Broach Irrigation Project.

1.3.37 In 1954 after some investigation preliminary report were prepared by the then Central Water & Power Commission for the Punasa Hydro-Electric Scheme and Tawa Project.

1.3.38 In 1955 the same Commission published a final study and then in 1957 a meeting was held which virtually recommended the four sites for generation of power below the contemplated Punasa Project (Narmadasagar).

1.3.39 Between 1960—62 a Project report for the key projects at Punasa both for power and irrigation along with several other projects were prepared by CWPC. As there was no agreement on sharing of Narmada waters in the discussions held between 1962-64 among the concerned states Government of India appointed sometime in September, 1964 a Committee (Referred to herein as Khosla Committee) *inter alia* for "best possible Master Plan for the utilisation of Narmada waters for irrigation, power development, navigation, flood control etc., in the most economical manner". Thereafter the Master Plan in outline was prepared by Madhya Pradesh sometime in 1965 and submitted to the Khosla Committee(3). As this Master Plan was drawn up at a short notice and left many more matters outside its consideration a revised Master Plan as already stated with "changes additions and modifications" was prepared by Madhya Pradesh State. Madhya Pradesh State has estimated its water requirements on the basis of (i) major projects, (ii) medium projects, (iii) minor projects, (iv) pumping schemes. The culturable command area of Madhya Pradesh State in Narmada basin or beyond basin on the basis of above projects and schemes is 70.70 lakh acres.

Determination of Culturable Area of Major Project of Madhya Pradesh

1.3.40 As already noticed, the culturable area of Madhya Pradesh has to be determined on the basis of

(1) GWS No. 2, p. 27.

(2) GWS No. 2, p. 32, MP-142.

(3) MP-74.

(i) Major projects, (ii) Medium projects, (iii) Minor schemes, and (iv) Pumping schemes. Madhya Pradesh State has subsequently filed project reports of 24 major irrigation projects in the Narmada basin in Madhya Pradesh. The total CCA of the major projects has been shown as 30.9 lakh acres.(1) It appears that detailed command surveys were not carried out in many projects although in 6 major projects CWPC carried out command surveys but as already seen these project reports were subsequently revised and in most cases areas were enhanced without any command surveys. It is said that detail command area surveys to prepare a 5 feet contour map of the command for laying down the canal systems have not been carried out in many of the major projects. This Tribunal directed Madhya Pradesh to carry out detail survey for a block of area more than 50,000 acres under the command of each in case of 3 major projects of Bargi, Tawa and Narmadasagar. On the results of such surveys GCA for all the major projects has been shown as 44,60,879(2) acres but GCA for 15 major projects for which soil-surveys have been carried out is shown as 37,55,124 acres.(3) Along with this 3,74,868 acres of GCA for the 9 projects if added would come to 41,29,992 acres.(4) However, GCA of 42,87,106 lakh acres have been indicated in the Master Plan.

1.3.41 Madhya Pradesh State has furnished particulars of culturable area in respect of major projects as follows:—

As per MP Statement No. 14		As per Exhibit MP--810	
1		2	
	Acres		Acres
Cultivated .	29,90,167	Sown area	29,79,345
Culturable fallows	3,04,650	Other uncultivated land, excluding fallow lands and culturable waste	
		A.... 1,51,448	
		B.... 62,828	
		C.... 70,194	
		2,84,470	2,84,470
Pastures & groves	1,55,395	Pastures & grazing land.	5,11,479
Culturable area in Revenue forests.	88,149	Misc. tree crop and grass.	6,835
Culturable area in reserved forests.	5,000	Culturable area available from forest.	40,859
Area under Nalas, river beds & ponds.	49,265	Culturable area under water.	69,370
	2,97,809		
Extra in Tawa & Sukta without breakup given in col. 12.	1,31,200	Fallow lands .	1,27,177
	37,23,826		40,19,575
		Deduct culturable area covered by existing & proposed medium & minor schemes	(—)46,796
		Area considered not available for irrigation	(—)2,50,119
			37,22,660

From the above it is clear that there is a difference of estimate in culturable area between these two statements and the revised Master Plan in which the figure is 34.94 lakh acres. On the results of the block survey made by Madhya Pradesh under the direction of this Tribunal Madhya Pradesh has shown the percentage as follows:—

Name of Project	Bargi project Khajuri distributary (MP-956 p. 6)	Tawa project Hoshaongabad & Itarsi distributary (MP-957 p. 6)	Narmadasagar Sanawad distributary (MP-982 p. 7)
1	2	3	4
1. Culturable command area (CCA in acres) (3-4) .	61869	62678	42014
2. Percentage of CCA to CA (per cent) . . .	95·8%	85·7%	93·6%
3. Percentage of CA to GCA (per cent) . . .	96·5%	84·6%	91·7%

1.3.42 It is, therefore, claimed by Madhya Pradesh that having regard to the percentage computed in the project report for Tawa, Narmadasagar and Bargi the percentage as now worked out is on the conservative side.

1.3.43 Gujarat, however, has contended that the percentage worked out by Madhya Pradesh in the block survey cannot be accepted as representative. Gujarat has shown such percentage for three projects, Bargi, Narmadasagar and Tawa at a lower figure. Gujarat has also submitted that there has been increase in area in respect of all these three projects not covered by the investigation of the then CWPC. Therefore, additional areas cannot be included within GCA of Major projects of Madhya Pradesh.

1.3.44 Madhya Pradesh State as appears has included 3.047 lakh acres as culturable fallow but Gujarat wants deductions of this area as being area of culturable waste class 'C' as not being reclaimable at a reasonable cost. Considering the arguments of both sides, the submission of Gujarat should be accepted and the culturable fallows of class 'C' of 0.70 lakh acres should be excluded.

(1) MP-1156, p. 26.
(2) MP-1156, Statement VI, p. 25.
(3) MP Statement No. 29.
(4) MP-1156.

1.3.45 Pastures and groves of 1.54 lakh acres are considered as culturable in Major projects by Madhya Pradesh. Gujarat has opposed this claim mainly on the ground that pastures cannot be included as culturable. In the case of Madhya Pradesh Khosla Committee allowed pastures within the culturable area of Madhya Pradesh. In the Guide to Current Agriculture Statistics there seems to be no restriction against inclusion of these lands as culturable lands. Pasture and grazing lands etc. may be included within the culturable area. The area both from revenue and reserve forests 0.881 plus 0.050 lakh acres *i.e.* 0.931 lakh acres have been included in the culturable area of Madhya Pradesh. According to the new classification(1) these areas may be put to some agricultural use and, therefore, there need not be any deduction of such area from agricultural area of Madhya Pradesh. With regard to the area of 49,265 acres under water, nalas, ponds, etc., Gujarat has objected to inclusions of this area under culturable area of Madhya Pradesh. It is said that not a single acre out of this area shown to have been cultivated at any time if any such area has to be cultivated it can hardly be done by irrigation.(2) In the facts and circumstances revealed this area should not be included within the culturable area of Madhya Pradesh.

1.3.46 With regard to the area of 1,31,200 acres shown as extra CA in Tawa and Sukta projects in Madhya Pradesh Statement No. 14, it appears Gujarat has shown (3) on demarcation that right bank of Tawa has overlapped the command of Dudhi project. It is, however, stated in the project report of Tawa(4) that the Right Bank canal has been reduced to 1 lakh acres instead 2.20 lakh acres which could be covered by expansion of the canal. Regarding Sukta project comparative figures shown in the project report of GCA and CA and the culturable area in Madhya Pradesh Statement No. 14 appear to be inconsistent. There is a difference of 19,000 acres in CA in Madhya Pradesh Statement 14 but this is small and should not be taken into consideration. The position, therefore, is as under:—

Culturable Area of Major Projects of Madhya Pradesh in Narmada Basin

(Lakh acres)

	As per M.P. State	As determined now
1. Cultivated area . . .	29·902	29·902
2. Culturable fallow—deduct for patches which are not reclaimable at reasonable cost (Class 'C' of culturable waste)= 0.702 (3·047—0·702) . .	3·047	2·345
3. Pastures and groves considered as culturable	1·554	1·554
4. Culturable area in revenue forests (no deduction for CA) . . .	0·881	0·881
5. Culturable area in reserved forests (no deduction for CA) . . .	0·050	0·050
6. Area under water; nalas; rivers and ponds	0·493	—
7. Difference in Tawa and Sukta without break-up.	1·312	—
	37·239	34·732

1.3.47 The balance CA of Major projects thus would be 34.732 lakh acres.

Culturable Command Area of Major Projects of Madhya Pradesh

1.3.48 Madhya Pradesh's estimates of Culturable Command Area in respect of its 24 major projects, is laid at 30.99 lakh acres, on the basis of 90 per cent of the C.A. Gujarat, as already noticed, has pointed out, I think rightly, that there cannot be any realistic determination of the actual commanded area in the absence of command area surveys. This Tribunal have, however, directed Madhya Pradesh to carry out detailed surveys for blocks of more than 50,000 acres under the command of three major projects, Bargi, Tawa and Narmadasagar. As already seen, Madhya Pradesh has shown in this survey(5), after computation of the percentage that CCA on comparison with the project reports of these three projects, would show that they are on the conservative side.

1.3.49 It appears that in this Survey(5) deduction from culturable area of high patches, cut-up areas or areas occupied by the proposed canal system or development works like roads, markets etc. and their respective percentages are not uniform. It is necessary that some uniform and reasonable basis should be found out for deducting high patches cut-up areas etc. for effective determination of Culturable Command Area of major projects. However, considering all aspects of the matter and percentages and area, I am of the opinion that there should be deduction of the total culturable area of major projects on account of (i) high patches and cut-up areas, (ii) pastures and groves, (iii) area under revenue and reserved forests and (iv) area for development works etc. as follows:—

(in lakh acres)

1. Basic culturable area in major projects, as suggested now . . .		34·732
2. *Deduct for*—		
(i) High patches and cut-up area at 10% of CA . . .	3·473	

(1) G-233 page 3.
(2) GWS 2 p. 27.
(3) G-1243.
(4) MP-179.
(5) Exhibit MP-1156.

(ii) Pastures and groves (25% of 1·554) . . .	0·388	
(iii) Area under revenue and reserved forests (50% of 0 931)	0·465	
	4·326	
		(—) 4·326
Balance :		30·406
3. Deduct area for development works @ 3·76 per cent of 30·406 on the basis of MP-1156 . . .		(—) 1·143
CCA of Major Projects of M.P.		29·263
Say . . .	29·26	lakh acres

1.3.50 It appears that in the Project Reports of 12 major projects (1), Madhya Pradesh has not shown in its land irrigability classification of soils any Class 5 lands as defined in soil survey manual, 1970. It has shown percentage of Class 6 lands as 0.42 per cent. Gujarat (2) has disputed the correctness of the land irrigability classification as worked out by Madhya Pradesh State. According to Gujarat, the percentage of classification of lands from Class 1 to 4 and 6 should be as follows:—(3)

Land Irrigability Class	(As per Gujarat)* Percentage	(As per Madhya Pradesh) Percentage
1	0·84	7·76
2	2·60	70·72
3	35·56	16·94
4	54·96	4·15
5	NIL	NIL
6	6·04	0·43

*Exhibit G/1240 p. 205

1.3.51 Gujarat submits that in the absence of data it has not become possible to work out lands under Class I. In the present state of evidence it is difficult to make any comment either way on Madhya Pradesh's contention that there are no Class 5 lands in the culturable command area of these major projects. However, Madhya Pradesh state has shown a very negligible percentage of lands as Class 6. As against Madhya Pradesh's percentage of 0.43, Gujarat has shown a percentage of 6.04 of lands under Class 6. It may be that Gujarat in its computation has given to certain extent high percentage. Even if it is so, I think, a fair and reasonable percentage of lands under Class 6 which are unsuitable for irrigation according to the guidelines of soil survey manual should be excluded from the total culturable command area of the major projects of Madhya Pradesh.

1.3.52 Considering all aspects of the matter, I think, 4 per cent should be accepted as proper and reasonable. In my opinion, an area on the basis of 4 per cent from the culturable command area of Madhya Pradesh should be deducted on account of Class 6 lands which are unsuitable to take irrigation. The position, therefore, should be as under:—

CCA of Major Projects of Madhya Pradesh as shown above .	29·26 lakh acres
Deduct on account of Class 6 lands @ 4% (i.e. 4% of 29·26) .	(—) 1·17 lakh acres
Balance CCA .	28·09 lakh acres

1.3.53 Accordingly, I determine the Culturable Command Area of major projects of Madhya Pradesh as 28.09 lakh acres.

Culturable Lift Area

1.3.54 This Culturable Command Area of Madhya Pradesh for major projects will also include about 3.03 lakh acres to be served by lift as proposed by Madhya Pradesh(4).

Culturable Command Area of Medium, Minor and Pumping Schemes of Madhya Pradesh in the Basin

1.3.55 Madhya Pradesh has claimed total CCA of 70.70 lakh acres covering major projects, medium projects, minor projects and pumping schemes and for diversion outside basin. Out of this area MP has claimed GCA, CA and CCA of medium projects, minor projects and pumping schemes as follows:—

Sl. No.	Details of Projects	GCA	CA	CCA
1.	Medium Projects .	27·56	23·19	19·71
2.	Minor Projects .			
	(i) CCA with more than 150 acres	11·10	9·44	8·02
	(ii) CCA with less than 150 acres	7·65	6·50	5·53
	(iii) Pumping schemes	9·00	7·65	6·50
	Total Minor Projects .	27·75	23·59	20·05
	Grand Total .	55·31	46·78	39·76

1.3.56 In the revised Master Plan Madhya Pradesh has shown the basis of its estimates of medium projects, minor schemes etc. As regards the medium and minor scheme Madhya Pradesh has admitted that in the absence of large scale map 4" to 1 mile it has not been able to identify the number of schemes. The total number of schemes as identified varies from 375 to 441. It is said that the gross area of each of the

(1) M. P. Statement No. 29.
(2) Exhibit G-1240 Vols. I & II.
(3) Gujarat Written Reply No. 24 p. 33.
(4) Ex. MP-312, Vol. II Statement 18(2).

identified medium projects has been marked on the map and planimetered. Out of this for 60 medium projects the culturable area out of gross command area has been worked out from villagewise statistics and on the basis of percentage worked out in respect of the culturable area from GCA for the 60 such projects, the total culturable area of each of the 441 identified and 16 assumed medium projects has been taken as 80 per cent of the GCA in the upper zone and 85 per cent in the middle and lower zones, except in certain tributaries or groups of smaller tributaries on which a lower percentage has been adopted in accordance with the village statistics and CCA of each medium project and has been taken as 85 per cent of the culturable area in the GCA. Although Madhya Pradesh has given particulars, *viz.* schemes, names of sub-basins, location of the command area, figure of the CCA, CA etc., details of break up of agricultural area have not been stated by Madhya Pradesh and thus are not available(1).

1.3.57 Madhya Pradesh has also filed proforma and index of maps of medium schemes in the upper middle and lower zones under the direction of this Tribunal in its 8th meeting (2). But it will appear that Madhya Pradesh has given in this proforma widely different GCA and CCA on the same basis as in its revised Master Plan without any surveys or investigation. As regards minor schemes, Madhya Pradesh has admitted that it would not be possible to locate them without the large scale map with smaller contour intervals *i.e.* 10 feet or less, but the preparation of such large scale maps will take many years and, therefore, irrigation potential of medium and minor schemes at present can be estimated only on general considerations such as total agricultural area. Accordingly Madhya Pradesh has, for the purpose of its minor schemes, taken 90 per cent of the gross area in the revenue areas and 80 per cent in the forest area. Madhya Pradesh has filed proforma of contemplated minor irrigation schemes(3). These proformae give figures of GCA, CCA and extent of annual irrigation season-wise upto an acre. In each proforma annual irrigation is given on ad-hoc basis upto 110 per cent of the CCA. In these circumstances, it is urged by Gujarat that it is not possible to make any realistic estimate of these medium and minor schemes on projectwise basis(4).

1.3.58 As already noticed, Madhya Pradesh has given on account of gross command area on this basis for all medium projects, minor schemes and pumping schemes an area of 55.31 lakh acres. Madhya Pradesh has subsequently estimated at a uniform percentage of 85 per cent of GCA for estimation of CA and 85 per cent of CA for determining(5) CCA but this percentage seems to be different as indicated in its revised Master Plan. As there was no detail investigation, the Tribunal directed Madhya Pradesh State to carry and complete detail surveys of certain selected blocks. Soil surveys were carried out and the reports(6) were submitted by Madhya Pradesh State. Madhya Pradesh State also submitted summary(7) of the results of these surveys from which it appears that percentage of area to be served by irrigation with medium and minor schemes to total area of the block varies in respect of upper, middle and lower zones from 45 per cent to 20 per cent.

1.3.59 Madhya Pradesh has stated on the analysis of the results of these surveys in its note on culturable area to be benefited by irrigation in the Narmada basin (summary of the results of the detail surveys) as below:—

> "The detailed analysis of the extent of possible irrigation by medium and minor schemes on the basis of detailed surveys shows that the percentage of the Culturable Command Area (CCA) to the Gross Command Area (GCA) for the medium and minor projects in the three zones work out to more than 80 per cent as under (vide details in Statements II and III)."

S. No.		Percentage of CCA to GCA for	
		Medium Projects surveyed in detail (Percent)	Minor Schemes surveyed in detail (Percent)
1.	Upper zone . . .	81·01	85·8
2.	Middle zone . . .	85·38	87·4
3.	Lower zone . . .	93·6	90·0
4.	Overall . . .	85·9	87·4

1.3.60 "It will thus be seen that with a gross area of 61.92 lakh acres which will be covered by medium and minor schemes worked out in para 8.2 above, it will be easily possible to cover a CCA of 39.76 lakh acres by medium and minor schemes as proposed in the Master Plan. (80 per cent of 61.92 works out to 49.5 lakhs acres)."

1.3.61 Gujarat has strongly disputed the correctness of the results shown by Madhya Pradesh in respect of these detail surveys. According to Gujarat, for medium and minor schemes the CCA calculated by Madhya Pradesh is over estimated by 35.26 and 70.92 per cent ($\frac{9.61}{13.55} \times 100$) respectively. Gujarat even arguing the correctness to the figures of CCA

(1) MP-350 CMP 44/74.
(2) MP-313 to 320.
(3) MP-300.
(4) Gujarat's WS No. 2 pp. 10 to 12.
(5) MP Rejoinder Vol. 2 Annexure 2 Statement I.
(6) MP-1107, 1108, 1077, 1106.
(7) MP-1156.

given by Madhya Pradesh has shown by comparison the figure of the percentage of CCA to GCA of medium, minor and pumping schemes respectively(1). Gujarat has also shown comparative percentage figures of CCA to GCA in medium, minor and pumping schemes of the block selected by Madhya Pradesh and the existing schemes. It would appear that in case of medium schemes the overall percentage of the existing scale shown 51.37 per cent for medium schemes, 67.91 per cent for minor schemes and for pumping schemes 70.04 per cent.

1.3.62 Gujarat has given its own estimate of the culturable command area of all the major, medium and minor and pumping schemes as follows:—

Sl. No.	Projects or schemes	Culturable command area claimed by MP	Area required to be excluded from the CCA claimed by MP	Culturable command area calculated by Gujarat after deducting area required to be excluded from the CCA claimed by MP (col. 3-4)
		lakh acres	lakh acres	lakh acres
1.	Major Projects(Statement No. 2 p. 7 herein below) . . .	30·99	5·33	25·66
2.	Medium schemes (Statement No. 3 p. 8 herein below) . .	19·71	6·95	12·76
3.	Minor schemes (Statement No. 4 p. 10 herein below)	13·55	9·61	3·94
4.	Pumping schemes .	6·50	6·25	0·25
	Total .	70·75	28·14	42·61

1.3.63 Gujarat has argued relying on map of the command areas of major projects, medium and minor schemes(2) that the schemes selected by Madhya Pradesh are all located along the fringes of the command areas of the major projects. Gujarat has shown that the proportion of the culturable area in the commanded areas of the major projects is 76.67 while the said proportion in the areas of the basin lying outside such command areas is only 40 per cent(3). Gujarat has submitted that the overall percentage of command area shown in GCA of medium and minor schemes selected by Madhya Pradesh itself works out to 65.16 per cent and 70.55 per cent respectively as against 42.57 per cent and 31.69 per cent respectively for the medium and minor schemes for which Gujarat asked for details persuant to its inspection. In fine, Gujarat has argued, on the available materials there is a difference of about 25 per cent for medium schemes and about 40 per cent for minor schemes(4). It is already noticed that according to Madhya Pradesh CCA is 85 per cent of GCA for medium and 87.4 per cent of GCA for minor schemes. If the deduction of percentage to sown area on which Gujarat relies is applied the CCA as argued by Gujarat will be 60 per cent of GCA for medium schemes and 48 per cent of GCA for minor schemes. It appears that adopting the percentage of GCA to CCA based on the schemes in operation or under construction, the GCA for medium and minor schemes would come to 30.09 lakh acres.

1.3.64 Gujarat has, however, contended that the area likely to be benefited by medium and minor schemes in Madhya Pradesh would not exceed 16.95 lakh acres. From the rival contentions of Madhya Pradesh and Gujarat, it seems clear that Madhya Pradesh and Gujarat largely differ on material points in their respective estimate of culturable command areas of medium projects and minor schemes. It is already indicated that in absence of command area surveys it is not possible to examine closely the correctness of contention of either party for determination of CCA of medium and minor projects. Nevertheless, some basis should be found out for determination of the CCA of the above projects.

1.3.65 Thus, after considering the arguments of the concerned party States and the relevant documents and papers and all available materials on record, I agree with the line of reasoning already given in Vol. I Chapter V para 5.14.10 to 5.14.13 of the report on this aspect of the matter and determine the CCA of medium and minor schemes at 30.09 lakh acres, particulars of which are given hereafter in paragraph 1.3.69 marked 'A'.

Pumping Schemes

1.3.66 As regards pumping schemes, although CCA has been determined by Madhya Pradesh on the basis of projection on the likely number of pumps but from the details of schemes already in operation or under construction the estimates of Madhya Pradesh do not appear to be correct. Madhya Pradesh has adopted 6.5 lakh acres CCA for pumping schemes. This area if compared on the percentage basis with the major projects, medium projects or minor schemes, then the estimate of 6.5 lakh acres seems to be on the high side. Considering all aspects of the matter 10 per cent of the area served by medium and minor schemes would be more reasonable and this would come to 3 lakh acres.

(1) Gujarat's sub-rejoinder No. 1 Statement No. 15 pp. 116 to 118, Statement No. 22 pp. 124, 125 and Statement No. 29 pp. 137, 138.

(2) Map No. 3 & 4.

(3) Gujarat's sub-rejoinder I pp. 22, 23.

(4) Gujarat's sub-rejoinder I pp. 35-36.

Diversion Projects of Madhya Pradesh State

1.3.67 Madhya Pradesh's case in substance is that about 5 lakh acres at the upper end of Mahanadi valley in the Durg and Bilaspur Districts and about 7 lakh acres in the Sone and Tons basins in the Districts of Jabalpur, Rewa and Satna are in acute need of irrigation owing to frequent scarcity conditions and erratic and uncertain rainfall there. As there is no adequate source of water supply from any nearby water resources it is necessary that water from Narmada should be diverted for irrigation purpose in these tracts which as investigations and studies reveal are feasible.(1) Accordingly, three projects, viz., (i) Bargi Diversion Project will serve a substantial area in the river valley of Sone and Tons in the three districts of Jabalpur, Rewa and Satna. The cost of the diversion work has been roughly estimated at Rs. 4336.00 lakhs with additional cost of about Rs. 1600 lakhs for storing of water in reservoirs in the Narmada basin and thus in all amounting to Rs. 5936 lakhs.(2)

(ii) The Upper Narmada Diversion Project is a scheme to divert water from Narmada to the adjoining Mahanadi basin (Sheonath plains) by two separate diversion channels one from a point approximately 20 miles upstream of the proposed Upper Narmada Reservoir and the other from the Upper Burhner Reservoir, Burhner being a major tributary of the Narmada. This project is expected to irrigate on the left bank of the Maniari river about 50,000 acres.(3)

(iii) *The Upper Burhner Diversion Project.* This project is expected to irrigate roughly 91,400 acres in the basin of Hap river. The total culturable area in the Hap basin which can be commanded by canals from Hap Reservoir is 2,65,400 acres. About 60 per cent of the area will be protected by irrigation from local and extra-basin sources.(4) For these diversions Madhya Pradesh claims a total area of 8.20 lakh acres as GCA, 7.23 lakh acres as CA and 6.03 lakh acres as CCA.

1.3.68 Gujarat has disputed the techno-economic feasibility of these three diversion projects of Madhya Pradesh for extra basin irrigation.(i) Regarding Bargi Project it is said that the Basania Dam site is not suitable for a masonry or an earthen dam as evident from the note of the Superintending Engineer of Madhya Pradesh State.(5) The proposed canals will fail to serve its respective purposes and that there is nothing to show that adequate storage sites are not available on the Tons for making use of local resources. Further, as there are adequate rainfall in the command in Satna and Rewa districts and in Katni basin of Jabalpur district, there is in fact no irrigation need(6) for both Kharif and Rabi crops.

(ii) As regards the Upper Narmada Diversion Project, there has not been any adequate investigation nor soil surveys in any part of the proposed command excepting a reconnaissance survey for Patpara lift dam site and for two Power Houses. Further, from the figures given by Madhya Pradesh State itself in the project report(7), available local resources would be adequate for irrigating the proposed CCA of 3.77 lakh acres which again is an over estimation. Having regard to the average rainfall in the command there is low irrigation need.(8) It is also said that the percentage of cropping intensity as adopted by Madhya Pradesh in Kharif and Rabi crops are unrealistically high irrigation intensities.(9)

(iii) Regarding Upper Burhner Project, it is said that there has been only reconnaissance geological information for the project area comprising water conductors system and power house but all other surveys including soil surveys have yet to be carried out. In any case the local sources are adequate to irrigate the proposed CCA of 3.18 lakh acres, which is an over estimation, with 100 per cent irrigation intensity with delta of 2.2 feet. The command area in any event has high degree of rainfall and thus has a low degree of irrigation need.(10) In these circumstances it is urged by Gujarat that the extra basin irrigation needs put forward by Madhya Pradesh are of doubtful feasibility, unrealistic, excessive and required to be ignored(11). Upon consideration of all the relevant documents and materials on record, I am of opinion that in these days of advanced technology the question of technical feasibility cannot create any problem. As regards the adequacy of rainfall it may be, at times, there may be adequate rainfall but there may not be wholly effective rainfall. However, cases may be visualised where inspite of adequate rainfall irrigation facilities are provided by way of protective irrigation or for increasing crop yields. As regards techno-economic feasibility of these 3 diversion projects, the benefit-cost-ratio as worked out in the project reports do not indicate that these projects are techno-economically not viable although it may be that the detailed investigations have not been made and estimates prepared. I do not think there is much of substance in the objections raised by Gujarat. Madhya Pradesh State has not given sufficient particulars for working out culturable command area of these projects by deducting high patches areas unsuitable for irrigation

(1) MP Statement of Case Vol. IV, p. 50.
(2) MP-312 Vol. IA, pp. 76, 77, 78 & 79.
(3) MP-312 Vol. I-A, pp. 80-81.
(4) MP-312 Vol. I-A, pp. 81-82.
(5) Ex. MP-161 Vol. II, p. 22.
(6) MP-161, Vol. I, p. 10 para 6, G-74, p. 19 Map. 8, p. 21 Map 9, p. 23 Map 10, MP-259, p. 161 to 164.
(7) MP-390, p. 2 Table. 102.
(8) MP-390, p. 3 Table 1·2, G-74, p. 21 Map 9, p. 23 Map 10.
(9) MP-390, p. (iii) and WS of Gujarat No. 2, pp. 56-57.
(10) Ex. G-74, p. 21, Map 9, G-74, p. 23 Map 10. MP-391, pp. 2-3 Tab 1·2 and p. 8 para 5.
(11) Gujarat's Written Submission No. II p. 18.

etc. as in the case of major projects (within basin in MP). In the facts and circumstances, therefore, there should be prorata deduction on account of high patches, area unsuitable for irrigation, forests etc. as in the case of major projects. This would work out to 5.70 lakh acres.

1.3.69 The position, therefore, is as under:—

'A'

CCA Of Medium, Minor and Pumping Schemes in Narmada sain in Madhya Pradesh

		lakh acres
(1) Medium Schemes :	GCA of medium schemes is given by MP as .	27·56
	CCA of medium schemes as claimed by MP . . .	19·71
	On the basis of information supplied by MP for medium schemes existing or under construction, the percentage of CCA to GCA=51·61%.	
	Considering that the future schemes may improve, CCA may be taken as 60% of GCA which comes to 27·56 x 60/100 . . .	16·54
(2) Minor Schemes :	(Excluding pumping schemes)	
	Madhya Pradesh has proposed 18·75 lakh acres (27·75-9·00) as GCA for minor schemes	18·75
	CCA claimed by MP for minor schemes . . .	13·55
	On the basis of information supplied by MP for minor schemes (Excluding pumping schemes) existing or under construction, the percentage of CCA to GCA=71·48%.	
	Considering that the future schemes may improve, CCA as considered by Madhya Pradesh may be accepted i.e. at 72·3% $\frac{(18\cdot75\times72\cdot3)}{100}$	13·55
(3) Pumping Schemes :	CCA of pumping schemes as proposed by Madhya Pradesh is 6·5 lakh acres. This is about 10% of major and medium and minor schemes or 20% of medium and minor schemes. 10% of medium and minor schemes would be more reasonable. (16·54+13·55) x 1/10	3·00
(4) Total figures of CCA for medium, minor and pumping schemes :		
	Medium	16·54
	Minor	13·55
	Pumping	3·00
		33·09

Accordingly, the CCA of MP in respect of major, medium, minor projects, pumping schemes and diversion schemes are determined as under:—(Claim of MP is also shown)

S. No.	Details of projects.	As claimed by MP			As determined	
		GCA	CA	CCA	CA	CCA
		(in lakh acres)				
1	2	3	4	5	6	7
1	Major projects	42·87	34·94	30·94	34·73	28·69
2.	Medium Projects	27·56	23·19	19·71		16·54
3.	Minor projects					
	(i) CCA with more than 150 acres .	11·10	9·44	8·02		8·02
	(ii) CCA with less than 150 acres	7·65	6·50	5·53		5·53
	(iii) Pumping schemes .	9·00	7·65	6·50		3·00
		27·75	23·59	20·05		16·55
4.	Diversion outside the basin .	8·20	7·23	6·03		5·70
		106·38	88·95	70·70		66·88

Thus, the CCA of Madhya Pradesh State in determined at 66.88 lakh acres.

Gujarat's Claim for Existing Releases Down Stream of Navagam

1.3.70 Gujarat in its pleadings (1) has stated that the final stage of development of irrigation down stream of Navagam would be virtually dry. It would deprive the people of their existing irrigation and domestic water supply as also navigation; besides there would be consequential effect of salinity ingress. The latter would pose a real problem concerning water supply to the city of Broach in particular. It is, therefore, essential from the above consideration that a certain minimum quantity of water normally 28 cubic metres per second i.e. 1,000 cusecs should be retained continuously below Navagam.

1.3.71 It is said that Narmada is navigable by sailing vessels and country boats for a total distance of 16 kms from Tilakwara to the sea almost during the whole year. The river is tidal upto Mangaleshwar about 66 kms from the mouth. Broach an important river port is about 18 kms down stream of Mangaleshwar.

1.3.72 In the past, Narmada was navigable for the vessels of 12 feet draft upto Broach but now with the increasing accumulation of silt in the river etc. sailing vessels with draft upto 8 feet can negotiate the bar only in a spring high tide. Navigation is possible for about 12 days in a month for sailing vessels of 50 to 100 tonnes capacity.(2) In old days Broach was a flourishing port; even during 1965—69, 430 sailing vessels entered this port and with only 13,107 tonnes of cargo.

(1) Gujarat's Statement of Case Vol. I p. 78.

(2) Gujarat's Written Submission No. 1A p. 38.

1.3.73 Gujarat has also given the figures of irrigation withdrawal by the irrigation schemes, lifting waters directly from the Narmada river. It has also given figure of withdrawal for Broach water supply schemes. The total committed use would be 253(*) Mcft. It is contended, I think, rightly, by Maharashtra that Narmada river even below Navagam does not remain navigable throughout the year. The only existing use that is shown is navigational use by sailing vessels near the mouth of the river from the spring high tides and that too for only 12 days in a month. This will still continue even on full development at Navagam and thus the demand for 1,000 cusecs for navigation is wasteful.

1.3.74 As regards water for irrigation and water supply scheme, it is pointed out that this requirement would be easily met with from the runoff available below Navagam from the catchment area in Gujarat which contributes 2.12 MAF at 75 per cent dependability.(2) The existing and planned uses in Gujarat below Navagam is shown as 1.05 MAF.(3) Moreover, large flows will be available as regeneration of about 7 lakh acres proposed in Narmada basin by Gujarat in the Navagam canal and also the irrigation on the Left Bank in Narmada basin from the Ukai project and Karjan project. Therefore, there is no justification for releases below Navagam for meeting the irrigation and domestic water requirement in Gujarat below Navagam.

1.3.75 As regards the question of salinity ingress, it is pointed out that it is relevant in the matter of water supply to about 125 villages along the banks of river between Navagam and sea which are dependent on river for their water supply but the requirement of water supply of these villages has not been stated by Gujarat. However, it would obviously be so small that it would be wasteful to let down 1,000 cusecs continuously below Navagam as suggested by Gujarat to stop salinity ingress; the more economic means would be to meet domestic supply to these villages on wells.(4) I accept these contentions as correct.

1.3.76 In the view I have taken in the matter, I am unable to accept Gujarat's claim for down stream releases.

Alternative Water Resources of en route Rivers crossed by Navagam Canal+300 in Gujarat

1.3.77 On this aspect Gujarat's case as appears from pleadings(5) seems to be that water resources of Gujarat are extremely limited although there are major rivers. No substantial water resources would be left after harnessing them except Narmada. The remaining rivers are small and the rainfall in those basins is low. It is said that the "statistics of the existing irrigation potential under all the multipurpose, major, medium and minor irrigation works including irrigation under private wells the total potential planned to be created by the end of Fourth Plan and the ultimate potential considering all the feasible schemes other than Narmada" would create ultimate irrigation potential of 6.55 million acres. Some waters, it is alleged, are available for Narmada high level canal from a number of main en route rivers crossing the canal through different sources.(6) The water resources of these rivers for Narmada canal were fully considered by the Khosla Committee which found on calculations that the water available for use from en route rivers is 0.34 MAF. According to Gujarat's case, availability of waters from main en route rivers would come to 0.383 MAF from three different sources as under:—(7)

(1) Surplus waters from storage schemes existing or contemplated on the en route rivers estimated at	0.215 MAF
(2) Water available from the existing weir schemes for their respective commands overlapping with the Narmada command estimated at	0.124 MAF
(3) Water available from the three catchments between the storage and the canal crossing at	0.044 MAF
Total	0.383 MAF

1.3.78 In the Master Plan(8) of water resources of such en route rivers, the availability of water from these rivers were estimated at the above figure and on this basis Gujarat prepared its Sardar Sarovar Project for total water requirement in the entire command.(9) This Master Plan of water resources, it is added, have since been revised(10) for reappraisal of waters available from such rivers for diversion into Narmada main canal and its branches as certain other particulars regarding the estimate of availability for such waters were sought for by M.P.

(1) G-86, p. 20.
(2) MR Note No. 6, p. 91.
(3) G-462.
(4) MR Note No. 6, pp. 91, 92.
(5) Gujarat's Statement of Case Vol. I, pp. 22, 23, Tab-GT-5.
(6) Statement of Case Vol. II, pp. 47—56, Annex. GA-15, G-83.
(7) Gujarat's WS No. IA, p. 43.
(8) G-186.
(9) G-177, Vol. III, p. 343.
(10) G-462, pp. 1 to 5 and 12, Statement No. 1·1.

in an application.(1) All these particulars have been given in the above Master Plan.(2) The total water, it is now alleged, from different sources for diversion into Narmada main canal and its branches has been estimated at 0.4122 MAF. Gujarat has dealt, it is further alleged, with each basin crossed by Narmada canal and its branches separately with existing and contemplated schemes thereon and taken a detail water account for each of such rivers that may cross the canal and its branches. It is said that in estimating total water requirements contribution from the various en route rivers crossing the canal and its branches has been deducted.

1.3.79 An abstract of water available for diversion into the Narmada main canal and its branch canals as enumerated in Revised Master Plan are set out as under:—

Particulars	Through reservoir Mcft	Through the weirs Mcft	From the uninter-cepted catch-ment by the canal (through level crossing)	Total	
				Mcft	MAF
1	2	3	4	5	6
En route rivers and streams crossed by Narmada main canal.	3018	5983	6799	15800	0·3622
En route rivers and streams crossed by Saurashtra Branch canals.	1483	140	562	2185	0·0500
En route rivers and streams crossed by Banni & Kutch Branch canal.	Nil	Nil	Nil	Nil	Nil
Total water available for diversion into Narmada main canal including Branches.	4501 Mcft	6123 Mcft	7361 Mcft	17985 Mcft	0·4122 MAF

1.3.80 Madhya Pradesh has raised various contentions attacking the correctness or validity of the assessment of availability of water of all the en route rivers crossing through Narmada high level canal. In the revised Master Plan (3) names of en route rivers of streams supposed to be crossed by the proposed high level canal along with the names of their tributaries and their availability of water for diversion into the canal reachwise with all their special features and characteristics as also availability of water from some of the projects whether existing or contemplated on some of these rivers with their respective water assessment in catchment area rainfall etc. have been fully enumerated. The availability of water of some of these rivers again have been assessed in the high level canal alignment study.(4)

1.3.81 It is contended that a comparative study of above two documents, as regards availability of surplus water for diversion into Narmada high level canal, will show considerable variation in Gujarat's assessment of such water. It is, therefore, urged that the figures in these two documents cannot be accepted as depicting the correct picture of water availability from the en route rivers for the high level canal.

1.3.82 It is said that without even taking account of the small en route rivers and tributaries from the major en route rivers crossing the canal there would be much more of surplus water than that shown by Gujarat for utilisation in Narmada High Level Canal. There are a number of projects either existing or proposed in the basin of Sabarmati, one of the largest and longest river crossing Narmada canal.(5) On the main stem of the river Dharoi reservoir project (Major) is under construction and Fatchwadi canal system is an existing irrigation scheme. In the revised Plan no surplus water has been shown to be available from Dharoi Project but it is contended that the reason in support of such non-availability of water, given is not correct.

1.3.83 All water, it is said, below Narmada High Level Canal out of Hathmati reservoir project will be surplus and go waste to the sea.

1.3.84 In the Dharoi Project Report(6) entire command originally consisted of 4.18 lakh acres but out of this command, 2.71 lakh acres has now been proposed to be brought under Narmada command.

1.3.85 There is also scheme for Fatehwadi Canal for irrigation of about 70,000 acres. Over and above, there is the original water supply requirements for Ahmedabad city and Gandhinagar to the extent of 377.2 cusecs. But now these water supply schemes would also be served by the proposed Navagam canal. It is contended from the above that existing projects and revised plans etc. the estimate of surplus water cannot be sustained as valid.

1.3.86 M.P. has made its own study (7) as to availability of water from the en route rivers of Gujarat crossing the High Level Canal and given an account of total availability of these rivers in three different regions on 50 per cent and 75 per cent dependability and shows that out of the total use of 5.00 MAF planned by Gujarat out of the available water it has plan for utilisation in Navagam canal

(1) CMP No. 209/1972.

(2) G-99-A. A list of 60 projects on en route rivers & their Project Reports. Proforma with Ex. numbers.

(3) G-462 Revised Master Plan.

(4) G-863 High level alternative canal alignment study.

(5) G-462, p. 105, G-462, pp. 137 to 139.

(6) G-185.

(7) MP-626.

only 0.4122 MAF. It is said that on a study of all the existing or contemplated projects, on these en-route rivers, that water available from en route rivers based on average flow would come to 4.03 MAF,(1) and the additional water available from Mahi basin on the same basis would be 0.96 MAF,(2) that is in all 4.99 MAF which after taking into account the underground water resources would be raised to 5.62 MAF.

1.3.87 Maharashtra has also raised objection and placed its own assessment at about 1.75 MAF.(3).

1.3.88 It may be mentioned that the revised estimate of Gujarat as 0.4122 MAF for en route rivers(4) include 0.25 MAF of Mahi water for 1,11,070 acres in Mahi command which Gujarat has proposed for inclusion in Navagam canal command. Excluding Mahi area from the command of Navagam canal the water available from en route rivers according to Gujarat's estimate would come to 0.162 MAF.

1.3.89 This aspect of the matter has been considered and discussed in details in Chapter VII of the Report and the available quantity of water from the en route rivers has been estimated as 0.282 MAF. I agree and adopt the same line of reasoning and determine the total quantity of water available to Gujarat from the en route rivers at 0.282 MAF.

(1) MP-626, pp. 23, 24.
(2) MP Statement No. 84 and G-626, pp. 26, 27,
(3) MR Note 5, p. 20,
(4) G-462,

PART II

WATER REQUIREMENTS OF MADHYA PRADESH AND GUJARAT

REQUIREMENTS FOR IRRIGATION

Claim of Madhya Pradesh

2.1.1 Madhya Pradesh in its Pleadings (1), claimed 26.80 MAF of water for irrigation within the basin and 3.40 MAF for irrigation outside the basin. However, this claim was reduced by Madhya Pradesh in its Revised Master Plan (2). It appears that Madhya Pradesh in its subsequent assessment(3) claimed 24.079 MAF of Narmada water for consumptive uses comprising of 23.279 MAF for irrigation for CCA for 70.70 lakh acres and 0.8 MAF for domestic and industrial uses.

2.1.2 Madhya Pradesh has also made an alternative(4) claim for irrigation of certain areas of land outside the Narmada Basin in Madhya Pradesh for three projects. It is said that this claim for water for extra basin areas is not a claim in addition to 24.079 MAF. Thus Madhya Pradesh has laid its total claim for Narmada waters at 24.079 MAF, *i.e.*, claiming a round figure of 24.100 MAF of water. This includes the claim for water for the above diversion schemes.

Claim of Gujarat

2.1.3 Gujarat in its Pleadings (5) made a total claim of 22.29 MAF. This was subsequently (6) revised and Gujarat claimed 22.02 MAF as follows:—

	Water requirements MAF
1. Irrigation . . .	20·73
2. Domestic and Industrial uses .	1·00
3. Releases below Navagam .	0·70
Total . .	22·43
Deduct availability from en-route rivers	(—) 0·412
Net Requirement .	22·02 MAF*

2.1.4 Gujarat has in a subsequent revised estimates (7) given particulars of its total requirements of water from Narmada for the commanded areas to be irrigated as follows:—

Water requirement for FSL 300 (*Based on* 1964-65 *Statistics*)

Sl. No.	Particulars	CCA lakh acres	Intensity of Irrigation % to CCA	Annual irrigation in lakh acres	Water requirements in MAF		
					At field	Transit losses at 50% of field requirement	At canal head
1	2	3	4	5	6	7	8
1.	Zones I to XI	54·02	91·06	49·19	8·54	4·27	12·81
2.	Mahi Command	6·33	91·25	5·78	1·04	0·52	1·56
2.	Banni	2·28	165·58	3·77	0·88	0·44	1·32
4.	Ranns	8·75	157·02	13·74	3·36	1·68	5·04
	Total	71·38	101·54	72·48	13·82	6·91	20·73

2.1.5 This net 20.73 MAF of water, if added with the quantum of water required for domestic and industrial uses and for use down-stream of Sardar Sarovar Dam, would come to 22.431 MAF excluding the alternative resources of water available to Gujarat. which would work out as shown above at 22.02 MAF.

2.1.6 At this stage, it will be convenient to mention, as already noticed, Prof. Ambika Singh, Assessor (Agronomist), pursuant to the directions of this Tribunal submitted a report (8) giving his estimates of reasonable water requirements of both the States of Gujarat and Madhya Pradesh within and outside Narmada Basin.

2.1.7 All the party States have put in their respective comments(9) on this Report and disputed the correctness of this Report from various aspects.

(1) MP Statement of Case Vol. 10, pp. 60-61 paras 5·22 & 5·24.
(2) Ex. MP-312.
(3) MP Statement No. 3.
(4) MP Written Submission No. 3, pp. 110-111.
(5) Statement of Case Vol. I, page 83.
(6) Gujarat Written Submission No. I-A, page 3.
* Gujarat Written Submission No. I-A, page 3.
(7) G-626, table 9.
(8) C-5.
(9) G-1288, MP-1198, MR-156 & R-308.

DETERMINATION OF WATER REQUIREMENTS OF MADHYA PRADESH

CCA of Madhya Pradesh

2.1.8 GCA, CA, CCA on different projects of Madhya Pradesh, as proposed by Madhya Pradesh, have already been discussed and I have determined the CCA of respective categories of projects and schemes as follows:—

GCA, CA and CCA as Claimed by Madhya Pradesh and as Determined Now

Sl. No.	Details of projects	As claimed by M.P.			As determined now	
		GCA	CA	CCA	CA	CCA
1	2	3	4	5	6	7
				In lakh acres		
1.	Major Projects	42·87	34·94	30·94	34·73	28·09
2.	Medium Projects	27·56	23·19	19·71		16·54
3.	Minor Projects					
	(i) CCA with more than 150 acres	11·10	9·44	8·02		8·0
	(ii) CCA with less than 150 acres	7·65	6·50	5.53		5.53
5.	Pumping Scheme	9.00	7.65	6.50		3·00
4.	Diversion outside the basin	8·20	7·23	6·03*		5·70
	Total	106·38	88·95	70·70		66·88

2.1.9 Thus water requirements of Madhya Pradesh for irrigation will be considered for CCA of 66.88 lakh acres.

Cropping Pattern and Irrigation Intensity in Madhya Pradesh

Cropping Pattern

2.1.10 Madhya Pradesh State has given particulars of the cropping pattern proposed at various stages and also the cropping patterns project-wise.(1)

Irrigation Intensity

2.1.11 Madhya Pradesh has given different figures of intensity of irrigation in its Statements and compilations from time to time submitted before the Tribunal.

Delta of Madhya Pradesh State

2.1.12 The case of Madhya Pradesh, in substance, is that it has greatly reduced the Deltas for cropping patterns adopted in different zones in Madhya Pradesh in its Outline Master Plan(2) but the approach of Khosla Committee(3) in determining Delta for Madhya Pradesh's water requirement for irrigation in Narmada Basin was not correct.

2.1.13 To sum up, Madhya Pradesh has given an overall picture of irrigation intensities, Deltas, in support of its total water requirement of 23.279 MAF for irrigation of 70.70 lakh acres of CCA as under:—(4)

Delta in the 3 Zones of the Narmada Basin in Madhya Pradesh by Major, Medium and Minor Projects and Pumping Schemes (5)

Sl. No.	Details of Projects	Total CCA (lakh acres)	Average Intensity Percent	Average Delta Feet	Average Water requirement MAF (3)x(4)x(5)	
1	2	3	4	5	6	7
1.	MAJOR PROJECTS :					
	Upper Zone	1·25	195	2·50	0·611	
	Middle Zone	22·22	157	2·38	8·296	
	Lower Zone	7·47	197	3·13	4·590	
		30·94			13·497	13·497
2.	MEDIUM PROJECTS :					
	Upper Zone	4·59	120	1·93	1·063	
	Middle Zone	10·96	114	2·03	2·524	
	Lower Zone	4·16	114	2·31	1·083	
	Total	19·71			4·670	4·670
3.	MINOR SCHEMES :					
	(More than 150 acres each).					
	Upper Zone	1·92	107	1·75	0·360	
	Middle Zone	4·59	109	1·94	0·970	
	Lower Zone	1·51	104	1·93	0·303	
	Total	8·02			1·633	1·633
4.	MICRO-MINOR SCHEMES :					
	(Less than 150 acres each)	5·53	100	1·5	0·829	0·829
5.	PUMPING SCHEMES :					
	Upper Zone	0·31	154	2·2	0·105	
	Middle Zone	4·36	161	2·4	1·685	
	Lower Zone	1·83	157	3·00	0·860	
	Total	6·50			2·650	2·650
	Grand Total	70·70	140†	2·35**	23·279	23·279

* This is an alternative claim if CCA of 70/70 lakh acres is reduced. Thus this was not added to the CCA as claimed by M.P.

(1) M. P. Statements No. 3, 5, 6, 8, 9, 12 and 19.

(2) MP-74, Vols. I & II.

(3) G-83.

(4) MP-712, Statement 13 & MP Statement No. 27.

(5) Statement 13 of MP/712 MP Statement No. 27.

† Overall average intensity.

** Overall average delta on irrigated area.

2.1.14 It appears that Prof. Ambika Singh discussed the question of cropping pattern and intensity in his Report (C-5). He has reduced the intensities for all classes of projects excepting Micro-minor on assigning reasons. The reduced intensities as recommended by him are as follows:

Projects	Intensity per cent
1. Major Projects	111
2. Medium Projects	110
3. Minor Projects	90
4. Micro-Minor Projects	100
5. Pumping Schemes	111

2.1.15 Gujarat has very much disputed the correctness of the irrigation intensities proposed by Madhya Pradesh from time to time. Gujarat, in substance, has argued that high intensities of irrigation as proposed by Madhya Pradesh on the proposed cropping pattern in different zones and under different projects would result in, apart from other obstacles, water logging in view of the topographic nature of the soil, rainfall, climatic conditions etc. in different Zones of Narmada basin in Madhya Pradesh.

2.1.16 In my view, in determining the percentage of irrigation intensity, there will be, no doubt, some amount of guess work. Nevertheless, upon consideration of relevant documents and materials on record, it seems to me that the percentage of intensity adopted for different categories of projects by Prof. Ambika Singh seems to be rather low.

2.1.17 It appears that in its Project(1) Reports of 24 Major Projects, the intensities adopted by Madhya Pradesh are on the high side. This has been discussed in some details from the comparative figures in some of the Projects in this Report.(2)

2.1.18 In my view, following the line of reasoning given there, it would be fair and proper to adopt an average intensity of 135 per cent for major projects and 120 per cent for pumping schemes.

2.1.19 As regards the intensities of Medium and Minor Projects, it will not be necessary for me to discuss the points in detail, for here again also I agree with the views already given in this report (Vol. I, Chapter VI of the Report).

2.1.20 In my view, it would be reasonable to adopt an average intensity of 90 per cent for medium projects and 75 per cent for minor and micro-minor schemes.

2.1.21 Prof. Ambika Singh has discussed in some details (C-5) cropping patterns for various categories of projects in the three zones of Narmada basin for the intensities proposed by him. I accept such cropping patterns as proposed by Prof. Ambika Singh in assessing the water requirements of Madhya Pradesh. With pro rata adjustment the same cropping pattern for irrigation intensities as determined above may be adopted.

Determination of Deltas in Madhya Pradesh

2.1.22 It appears that Prof. Ambika Singh has adopted the figures of deltas given by Madhya Pradesh, as noticed and recorded earlier(3). Adopting the line of reasoning given in Vol. I, Chapter VI of the Report weighted average deltas as given in Table IV of the Report comes to:

Major Projects	2·57
Medium Projects	2·07
Minor Projects	1·89
Pumping Schemes	2·56
Micro-Minor Schemes	1·5

feet at canal head, and they are accepted as reasonable and proper.

Water Requirements of Madhya Pradesh for Irrigation

2.1.23 On the basis of the figures for irrigation intensities and deltas, accepted as above, the water requirements of Madhya Pradesh for irrigation in the CCA, as determined by me, works out as under:—

Sl. No.	Category of projects	CCA in lakh acres	Intensity percentage	Delta in feet at canal head	Water requirements in MAF
1.	Major Projects :				
	(i) Within basin	28·09			
	(ii) Outside basin	5·70			
	Total	33·79	135	2·57	11·72
2.	Medium Projects	16·54	90	2·07	3·081
3.	Minor Projects	8·02	75	1·89	1·137
4.	Micro-Minor Schemes	5·53	75	1·50	0·622
5.	Pumping Schemes	3·00	120	2·56	0·922
	Total	66·88			17·482 MAF

2.1.24 Thus the water requirements of Madhya Pradesh for Irrigation is 17.482 MAF.

(1) MP-712, Statement 13.
(2) Vol. I, Chapter VI.
(3) MP-712, Statement No. 13.

WATER REQUIREMENTS OF GUJARAT

CCA in Gujarat

2.2.1 Gujarat, as already noticed, has proposed for irrigation, the following culturable commanded areas:—

Area	CCA (in lakh acres)
1. Zones I to XI	54·02
2. Mahi Command	6·33
3. Banni and Ranns	11·03
Total	71·38

Mahi Command

2.2.2 At this stage, it would be convenient to take up the case of Gujarat's water requirement for Mahi Command.

2.2.3 Mahi is one of the major rivers flowing through Gujarat. There is a project called Mahi Right Bank Canal Project in Gujarat State for irrigation of certain areas of 7.80 lakh acres (Gross). Gujarat's case now *inter alia,* is that as a part of the integrated planning which was adopted by the Khosla Committee area which is at present being served by the Mahi Waters ex-Wanakbori weir would be supplied with Narmada water and the Mahi water so released would be diverted into the proposed Kadana High level canal off-taking at a level of +380 for irrigating higher lands in Gujarat. This latter canal also provides for irrigation in the Jalore and Barmer districts of Rajasthan on full development of Mahi waters. Such an integrated planning would ensure optimum development of the water resources of the region.(1) Gujarat has estimated 6.33 lakh acres as CCA(2) of this Command for irrigation from Narmada waters.

2.2.4 Both the States of Madhya Pradesh and Maharashtra opposed this claim of Gujarat as illegal, untenable and beyond the jurisdiction of the Tribunal.

2.2.5 The objection of MP State mainly is, apart from the legality of the claim, that though in the SSPR,(3) the CCA of Zones I to XI and Mahi Command was not available separately, Gujarat has given its CCA as 54.05 lakh acres and 7.80 lakh acres respectively. It is, therefore, clear that in the SSPR and pleadings, Gujarat has adopted arbitrary figures for the respective CCA of Zones I to XI and Mahi Command.(4)

2.2.6 Maharashtra has submitted that allocation of water from Narmada to the existing Mahi Command area would be illegal and beyond the jurisdiction of this Tribunal as Mahi which is a separate river was not included within the subject matter of reference of the present dispute before this Tribunal. It is, therefore, urged that this Tribunal has no jurisdiction to go into the merits of Gujarat's case and make any allocation of waters from Narmada to the existing Mahi Command area which forms a project of Mahi river.(5) Even assuming, it is submitted, that the Tribunal has jurisdiction to order transfer of areas under the command of Mahi to the Narmada, there is no valid ground for transfer since admittedly Mahi Right Bank Project, Stage I, is approved and already completed. In any case, such a transfer would result in allocating more water to Rajasthan than 0.5 MAF which it is not entitled to get under the agreement dated 12th July, 1974.(6) It is also urged, neither Gujarat nor Rajasthan has furnished any project report to justify the transfer and use of water for utilising area upstream of canal to be served by FSL 300. The note Ex. G-260 only gives vague and criptic reference to any of such areas of water without details or data.

2.2.7 After considering the arguments advanced by both the States of Madhya Pradesh and Maharashtra and the relevant documents and papers, on this aspect of the matter, I think Gujarat's claim for Narmada water for irrigation of Mahi Command cannot be accepted. Firstly, in the facts and circumstances of this case, it is doubtful whether this Tribunal has jurisdiction to consider any claim of the Gujarat arising out of Mahi river. Secondly, even if this Tribunal has any such jurisdiction, there cannot be any valid reason for transfer of this project for irrigation from Narmada waters since admittedly Mahi Right Bank Canal Project, Stage I, is approved and is already completed and partly in operation. This claim of Gujarat is, therefore, disallowed.

CCA in Ranns and Banni

2.2.8 As already indicated, the break up areas of Ranns and Banni are as follows:—

Location	Area (in lakh acres)
1. Banni	2·28
2. Great Ranns	
(i) Northern Border . .	4·50
(ii) Eastern Border . .	2·25
3. Little Rann . . .	2·00
Total .	11·03

(1) Statement of Case Vol. I, pp. 68, 69, para 56·3.
(2) G-626, G-630-A/1.
(3) G-177.
(4) MP Written Submission No. 4, pp. 10-11.
(5) MR Statement of Case Vol. 5, p. 50.
MR Rejoinder Vol. 12, pp. 57, 61 and 62.
(6) C-1.

2.2.9 I have already considered the feasibility of reclamation and crop-cultivation of these areas and held that the reclamation of Banni and Little Rann areas is possible. But as it would not be possible to reclaim all the areas of Ranns and Banni due to paucity of waters, I have determined that the following areas in the Ranns and Banni should be included for water allowance within the CCA of Gujarat:—

1. Banni	2·28 lakh acres
2. Little Rann	2·00 lakh acres
	4·28 lakh acres

Irrigation Intensity in Ranns and Banni

2.2.10 On this aspect of the matter, Gujarat has already given particulars of irrigation intensity as indicated earlier(1).

2.2.11 Gujarat has given crop-wise, irrigation intensity, annual irrigation, delta and water requirements for Banni and Ranns (CCA 2.28 and 8.75 lakh acres respectively). (2)

2.2.12 It is also stated that high irrigation intensities are to be adopted for keeping down the salt. On the basis of particulars(3) given by Gujarat in support of its claim of water requirements for Banni and Ranns, intensity for Little Rann would be 157 per cent and for Banni intensity should be adopted as 166 per cent for 2.28 lakh acres. As regards Delta, for Little Rann, the delta of 3.68 feet at Canal head and for Banni, the delta of 3.5 feet should be accepted. Thus the water requirements of Gujarat on account of these two areas, *i.e.* Little Rann and Banni, as determined by me, works out as under:—

Sl. No.	Area	CCA in lakh acres	Intensity percentage	Delta in feet at canal head	Water requirements in MAF
1.	The Little Rann	2·00	157	3·67	1·15
2.	Banni .	2·28	166	3·5	1·32
	Total .	4·28			2·47 MAF

2.2.13 This takes me to Gujarat's proposal for irrigation of CCA of 54.02 lakh acres in Zones I to XI. I have already determined that only CCA of 50.00 lakh acres in the Zones I to XI should be accepted for irrigation from Narmada waters.

Cropping Pattern of Gujarat

2.2.14 In the Report of Dr. Ambika Singh (C-5), the cropping pattern as proposed by Gujarat for Zones I to XI, has been accepted by him, as they are almost similar to the existing cropping pattern of Gujarat. This is right and the cropping pattern given by Gujarat is accepted.

Irrigation Intensity of Gujarat

2.2.15 As regards irrigation intensity of Gujarat, it is said that with a view to maximisation of agricultural output with the application of limited quantity of water, which is a scarce resource and with a view to extend irrigation to the maximum area within physical limits of the command with the waters available, Gujarat has proposed extensive rather than intensive irrigation. (4)

2.2.16 Gujarat has at one stage furnished particulars of the irrigation intensity in the commands separately by ground water and by surface waters as under:—(5)

(1) *Ultimate irrigation intensity by surface waters:—*

	CCA (lakh acres)	Annual Irrigation (lakh acres)	Irrigation Intensity
Area other than Ranns and Banni .	61·25	55·97	91·4%

(2) *Ultimate Irrigation Intensity by ground waters:—*

	CCA (lakh acres)	Annual Irrigation (lakh acres)	Irrigation Intensity
Area other than Ranns and Banni .	2·95	3·25	110%

2.2.17 It also appears that Gujarat has, in subsequent compilation(6), given its intensities for Zones I to XI, ranging between 60 per cent for Zone V and between 110 per cent for Zone IX-A. The weighted average intensity comes to 90.36 per cent and Gujarat has claimed water on that basis.

2.2.18 It appears that Prof. Ambika Singh took the view that in the Zones I to XI, there should not be more than 65 per cent intensity due to paucity of water and soil conditions. However, adopting the line of reasoning given in Vol. I, Chapter VI, para. 6.5.6 of the Report, I am of the opinion that the reasonable intensity for estimating the water requirements should be taken as 85 per cent with a cropping pattern proposed by Gujarat.

Delta in Gujarat

2.2.19 Gujarat has estimated transit losses at 50 per cent of field requirements to work out the irrigation water requirement at the canal head of Zones I to XI. (7)

2.2.20 It appears, Prof. Ambika Singh in his Report (C-5) has accepted the Delta worked out by Gujarat as reasonable. But this is subject to his remark that if the canal, branches and distributories upto the 100 cusecs capacity are lined then 50 per cent transit losses as shown by Gujarat is an over

(1) Gujarat's Written Submission No. IA pp. 25, 26, 27.
(2) —Do—
(3) —Do—
(4) Gujarat's Written Submission No. I-A, page 22.
(5) *Ibid*, page 24.
(6) Ex. G-960.
(7) Ex. G-626 and Ex. G-960.

estimation and the losses cannot be accepted to be more than 33.3 per cent.

2.2.21 I agree with the line of reasoning given in Vol. I, Chapter VI, paras 6.5.7 of the Report on this aspect of the matter and I am inclined to take the view that transit losses equal to 50 per cent of the water received at the field is not unreasonable in major projects with their larger channel lines. It is to be noted that both Gujarat and Madhya Pradesh have adopted this figure, which should be accepted.

2.2.22 Accordingly, the water requirements of 12.55 MAF of water for Annual Irrigation of 48.812 lakh acres gives a delta of 2.57 feet at canal head with a transit losses of 50 per cent of the water reaching the field head(1). This delta is accepted.

Water Requirements of Gujarat for Irrigation

2.2.23 I have determined CCA of Gujarat for Zones I to XI at 50.00 lakh acres. Considering this area with intensity of irrigation at 85 per cent and delta of 2.57 feet at canal head, Gujarat's water requirement for irrigation comes to 10.92 MAF.

Water requirements for Domestic and Industrial purposes

Madhya Pradesh

2.2.24 On this aspect, the case of Madhya Pradesh is that it requires for domestic and industrial annual consumptive use including thermal power station's use, a total quantity of 0.800 MAF water(2). This calculation is based on a daily rate of 45 gallons per capita in urban areas considering the gradual increase in the population from 1971 to 2021. During the same period, Madhya Pradesh has claimed 15.8 gallons per capita for the rural areas. The transmission losses from the river system to the treatment plant, it is said, will be above 15 per cent; consumptive for industries at various places has been worked out at 40 per cent of the plant use within the basin and 100 per cent for plant use outside the basin as for domestic supply because the conditions are similar. So considering these and other factors(3), the total requirement has been assessed at 0.8 MAF.

2.2.25 It may be noted that the requirements for consumptive uses for domestic purposes to be made from Narmada has been worked out to be 0.439 MAF.

2.2.26 As regards industrial requirements, the total annual consumptive use of the industry and the thermal power stations comes to 0.395 MAF. So the total would come to 0.834 MAF, rounding it off to 0.8 MAF.

2.2.27 It appears that Gujarat has disputed the claim of MP State as regards its water requirement of industrial and domestic uses. According to Gujarat's assessment, total use for domestic purposes of MP State in the Narmada Basin works out to 0.415 MAF(4) and not 0.439 MAF(5), as claimed by Madhya Pradesh and embodied in its Master Plan. Equally, on industrial requirement according to Gujarat's estimate requirement from surface water would work out to 0.32 MAF as against 0.37 MAF estimated by Madhya Pradesh.(6) Nevertheless, it has been stated that since 'the requirements of industrial and domestic use being small, Gujarat states that it has no quarrel with Madhya Pradesh's estimate of 0.8 MAF for its total consumptive use for domestic water supply and industrial use to be served by Narmada waters.'(6)

2.2.28 Although the total consumptive uses of Madhya Pradesh has been shown for domestic and industrial purposes from surface waters as 0.800 MAF, the withdrawal from the river flows for these uses would be 1.519 MAF. The difference of 0.719 MAF will be counted for regeneration and return flow. On the basis of regeneration and return flows, which is taken into account in assessing 28.00 MAF of utilisable water of 75 per cent dependability, the requirements of Madhya Pradesh for domestic and industrial use of water necessarily has to be estimated as 1.519 MAF instead of 0.800 MAF as its consumptive use, *i.e.* rounding it off to 1.52 MAF.

Gujarat

2.2.29 Gujarat's requirements of water for domestic and industrial uses both for urban and rural areas has been estimated at 1.00 MAF from the proposed Narmada Canal. Considering the needs of growing population of the city of Ahmedabad and other cities, within the command of the canal, in future, this estimate is projected upto the year 2001 A.D.(7)

2.2.30 From the accounts given by Gujarat, the total comes to 0.87 MAF but this has been rounded off to 1.00 MAF. Both Madhya Pradesh and Maharashtra States have denied such claim of Gujarat as excessive and unjustified(8). In support of its contention Madhya Pradesh has referred to certain documents(9) to show that earlier Gujarat's claim was much less as it claimed only 0.6 MAF for both uses. It is next, pointed out that in rural areas exploitation of ground water resources for drinking purposes

(1) Ex. G-960.
(2) MP-312, Vol. I-A, page 22, para 18. 557.
(3) MP-312 Vol. I, pages 161 to 164 MP Statement No. 85.
(4) Gujarat's Written Reply No. 10, pages 75-76.
(5) MP 312, Vol. I, p. 163.
(6) Gujarat's Written Reply No. 10, p. 77.
(7) Gujarat Written Submission Vol. I-A, pp. 39-41.
(8) MP Rejoinder Vol. X, p. 137, MR Rejoinder Vol. XII, p. 67.
(9) G-369, p. 28 and G-183, p. 58.

would be much more economical.(1) Then it is submitted that assuming the total requirement of Gujarat for domestic and industrial use would come to 1.00 MAF, then also 0.413 MAF, according to Gujarat's own earlier scheme is available from Dharoi Project.(2) The balance claim would thus come to 0.582 MAF. The use being consumptive the annual requirement would at best only be 40 per cent and that means the total requirement of 0.233 MAF. It is stated that a large part even of this quantity of water can be obtained from en route rivers and ground waters.(3) Gujarat, however, now wants the entire water from Dharoi for irrigation purpose under its direct command and burden Narmada waters with supply for drinking and industrial use. It is said that "even otherwise the exercise has been carried out on the basis of 1.00 MAF when in fact Gujarat's industrial and domestic use requirements according to its own figure is 0.870 MAF.(4)

2.2.31 However, I agree and adopt the line of reasoning given in Vol I, Chapter VI, paras 6.7.1 to 6.8.1 of the Report. Accordingly the total requirements of Gujarat for domestic and industrial uses would come to 1.343 MAF. After deducting 0.284 MAF being the quantum of water, which is already available or has been secured for domestic and industrial use by Gujarat the balance total requirement would come to 1.059 MAF, round it off to 1.06 MAF.

2.2.32 In the premises, the total water requirements for domestic and industrial purposes both for Madhya Pradesh and Gujarat are determined as under:

Madhya Pradesh	—	1.52 MAF
Gujarat	—	1.06 MAF

(1) G-65, pp. 9, 26 and 45. MP-832 Article 'Extract from Water for Human Needs' Taraporewala, pp. 1, 2 and 3.
(2) G-185, Vol. I, p. 28.
(3) MP Statement No. 86.
(4) MP WS Vol. VII, Part I, p. 192.

PART III

APPORTIONMENT OF WATERS OF RIVER NARMADA

3.1.1 This is the most important question involved in the Amended Issue No. 7(b), which is as under:—

> "7(b) How and on what basis should equitable apportionment of 27.25 million acre feet of water be made between the States of Madhya Pradesh and Gujarat ? What should be the allocation to either State?"

3.1.2 In terms of the Agreement dated 12th July, 1974(1) between all the party States, under clause (3), "the quantity of water in Narmada available for 75 per cent of the years" was assessed "at 28.00 million acre feet and that the Tribunal in determining the disputes referred to it do proceed on the basis of that assessment".

3.1.3 In terms of clause (4) of the said Agreement, the States of Maharashtra and Rajasthan were given 0.25 million acre feet and 0.5 million acre feet of waters respectively for use in their respective territories without prejudice to the level of the Canal.

3.1.4 In terms of clause (5), the balance of net available quantity of water for use in Madhya Pradesh and Gujarat was determined at 27.25 million acre feet and it is provided therein that the Tribunal for determining the disputes referred to it would proceed on the basis that the net available quantity of water for use in Madhya Pradesh and Gujarat is 27.25 million acre feet.

3.1.5 In clause (6) of the Agreement, it is provided, "that the Tribunal do allocate this balance of water, namely, 27.25 million acre feet between Madhya Pradesh and Gujarat after taking into consideration various contentions and submissions of the parties hereto".

3.1.6 A question arose as to whether (a) evaporation losses, (b) regeneration or return flow, and (c) carry-over storage should be taken into consideration while making appointment of 27.25 MAF of water.

3.1.7 It was agreed by all the party States that this Tribunal would not be required to go into these questions over again, in view of the Agreement reached between all the party States in the Official Level Discussions(2) where net utilisable flow by agreement was determined at 28.00 MAF for present planning of utilisable of Narmada waters by all the concerned States before this Tribunal.

Total Requirements of Water

Gujarat's Claim

3.1.8 Gujarat claimed its total water requirements as under:—(3)

	Water Requirements MAF
1. Irrigation	20·97
2. Domestic and Industrial Uses	1·00
3. Releases below Navagam	0·70
Total	22·67
Deduct availability from en route rivers :	(—)0·38
Net requirement	22·29

3.1.9 But this quantity of water was exclusive of evaporation losses in the Sardar Sarovar Project, Gujarat also claimed 23.49 MAF inclusive of evaporation losses in the Sardar Sarovar Project of the Narmada water consumptively every year. Subsequently, after adjusting a total quantity of water of 0.4122 MAF as per its revised Master Plan (4), Gujarat claimed 22.02 MAF of water for consumptive use exclusive of evaporation losses. Gujarat, however, subsequently claimed 22.02 MAF of water as its total requirement inclusive of evaporation losses.

Madhya Pradesh's Claim

3.1.10 At the outset, Madhya Pradesh estimated its water requirement also follows:—(5)

1. Irrigation within the basin	26·80	MAF
2. Domestic and Industrial use	2·00	MAF
3. Irrigation outside the basin	3·40	MAF
Total	32·20	MAF

3.1.11 Thus it was said that no water would be left for Gujarat after satisfying the need of Madhya Pradesh for its consumptive use of Narmada waters.

(1) C-1.
(2) G-73.
(3) Gujarat Written Submission No. I-A, p. 1.
(4) G-462, Written Submission of Gujarat Vol. I-A.
(5) Statement of Case Vol. 10, pages 60-61, paras 5·22—5·24.

3.1.12 Madhya Pradesh, however, as already noticed, reduced its claim of total water requirement to 24.079 MAF. This was inclusive of evaporation losses.

3.1.13 Madhya Pradesh also made an alternative claim of 2.165 MAF for consumptive use beyond basin areas through three Projects, Upper Narmada, Upper Burhner and Bargi Diversion, as already noticed.

LAW OF EQUITABLE APPORTIONMENT

3.2.1 At this stage, it would be convenient to look into the law or legal principles of equitable apportionment, for Gujarat has founded its claim for share of Narmada water on the basis of the principles of equitable apportionment. This really is a branch of international law on water disputes between sovereign States and it has taken its present shape as a result of the progressive thinking on international law and the principles enunciated from time to time by courts and tribunals concerning water disputes both on international and inter-State level.

3.2.2 Briefly speaking in its historical perspective, four theories have so far been developed in matters relating to regulation of rights of different riparian owners for diverting waters of international rivers for their use. The theories are:—

(i) Territorial integrity;

(ii) Absolute territorial sovereignty;

(iii) Community of co-riparian states in the waters of an international river; and

(iv) Limited territorial sovereignty.

(i) *Territorial Integrity*

3.2.3 The Territorial Integrity theory is also known as 'natural water flow' theory. Under this theory river is considered as a part of the territory of a State and consequently every riparian owner is entitled to the natural flow of the river unhampered by the upper riparian owners, otherwise it would result in violation of its territorial integrity. The principle is drawn from the English Cases dealing with private property rights in water in a unitary State. But as put by Jerome Lipper:

> "No case has been found in which the theory of territorial integrity has been applied by any tribunal in a dispute involving the rights of co-riparian states in the uses of the waters of an international river. Nor is there evidence of a state having accepted a diplomatic settlement based upon this theory. Indeed, the assertion of the theory by Egypt during the Nile Commission hearings in 1925 concerning the Egypt-Sudan dispute is the only instance discovered where such an attempt was made. The Commission rejected the Egyptian position that it had an absolute right to the natural flow of the waters."..... (1)

3.2.4 The case of Wuttemberg *Vs* Baden decided by the Supreme Court of Germany is sometimes cited in support of the territorial integrity theory. It is open to doubt whether the decision realy rested on this theory, for although the courts while appearing to apply the above theory in fact weighed the interest of each State in equitable manner. ..... (2)

3.2.5 Jerome Lipper concludes that, "with the possible exception of Judge Lauterpacht, research discloses no modern authority who adopts the territorial integrity theory as a rule of international law." ..... (3)

3.2.6 It is fairly established by now, that this theory is obsolete.

(ii) *Absolute Territorial Sovereignty*

3.2.7 This theory known also as 'Harmon Doctrine' was advanced by the then Attorney General Harmon of the United States in the later part of the 19th Century in connection with the disputes between the United States and Mexico over the use of the waters of the river Rio Grande. This goes to another extreme as it advocates that riparian states have exclusive or sovereign rights over the waters flowing through their territory.

3.2.8 This theory seems to be the most controversial of all the theories in international law, as it has been asserted from time to time by the United States in controversies with Canada and with Mexico. But it appears that it has been rejected as a rule of international law in the gradual process of time. As put by Jerome Lipper:

> ".....the Harmon Doctrine was not an expression of international river law. Rather, it was an assertion that, there being no rules of international law which governed, states were free to do as they wished. No subsequent development of the principle supports its inclusion as a part of the law of international rivers."...(4)

(iii) *Community of co-riparian states in the waters of an international river*

3.2.9 Under this theory, the basin is regarded as an economic unit irrespective of State boundaries and the waters are either vested in the community or divided among the co-riparian states by agreement. This is based on the theory of community approach to international waters and becomes fruitful only on the mutual agreement between the concerned States regarding joint planning, management, construction, for development of the water resources of the river for their joint benefits without any reference to the states frontiers. But this can be hardly regarded as a rule of international law as a basis of community approach rests on the joint agreement between the concerned states for exploitation of waters of an in-

(1) The Law of International Drainage Basins; edited by Garretson, Hayton & Olmstead; page 18.

(2) The Law of International Drainage Basins; edited by Garretson, Hayton & Olmstead; page 19.

(3) The Law of International Drainage Basin, edited by Olmstead etc., page 20.

(4) The Law of International Drainage Basins, edited by Olmstead etc., pp. 22-23.

ternational river. This theory of integrated development of community approach may be of two types:—

(a) Separate programme of development by each riparian state with the problems of other riparian state for use of their territory for all or any of the parties connected with such development.

(b) The other one and more advanced approach concerns of a joint effort by different states to develope the river for their joint benefits without any reference to the state frontiers.

But this may not necessarily result in the development of community basin or they may otherwise turn out to be economically wasteful, as stated by Jerome Lipper:

> "This approach stems from the practical consideration that the geography of a river often has little if any relationship to the political frontiers which divide it, and in order to make optimum use of its waters it is often necessary to develop an integrated programme for the entire drainage basin. The ideal location for a necessary installation, such as a dam for harnessing basin waters for hydroelectric use, may be within the territory of a riparian state uninterested in such a use, while only a less desirable location would be available in the interested co-riparian state. In such a case, the principle of equitable utilization may not permit the most beneficial development of the basin. Moreover, parallel independent development of a river by each riparian is likely to prove economically wasteful."(1)

(iv) *Limited Territorial Sovereignty*

3.2.10 Lipper states that this theory "while it does not extend as far as the principle of a community in the waters, nevertheless restricts the principle of absolute sovereignty to the extent necessary to insure each riparian a reasonable use of the waters.....(2) "The difference between the community and limited territorial sovereignty theories is one of degree. Under the former the waters are developed as an entity with extensive exchange of information and the undertaking of joint projects. The territory of one state may be utilised for the benefit of the other..."

3.2.11 "Limited territorial sovereignty merely calls for an equitable distribution of the waters; the riparian states develop the river separately rather than as one economic unit each engaging in its own projects."....(3).

3.2.12 Thus this theory which means equitable utilisation, has developed slowly and gradually and assumed its present form as a result of Governmental Pronouncements, treaties, conventions and declarations concerning use of water of international river, decisions of international tribunals and courts on international water disputes and the opinions expressed by the commentators and publicists from time to time. Resolutions have been passed by the Institute of International Law in 1911 known as 'Madrid Declaration' and thereafter from time to time, by international bodies of lawyers stressing the need of equitable solution based upon equality of rights in utilising of international water or water courses by sovereign States.

3.2.13 To be short and precise, I may say that on a review of historical background, Jerome Lipper states:—

> "In 1958, the International Law Association, as a party of an ambitious project which it undertook to restate and develop the law of international rivers and drainage basins, resolved that 'each co-riparian is entitled to a reasonable and equitable share in the beneficial uses of the water of a drainage basin' what is reasonable and equitable must be left to the facts of the particular case.
>
> "The I.L.A. resolution limited the application of the rule to co-riparians. However, at its 1966 conference the Association approved the Helsinki Rules, which in Article IV provide that each basin state is entitled to a reasonable and equitable share in the uses of the waters. No hard and fast rule respecting the actual division of the waters has been adopted; the criterion is solely one of equitable utilisation, which, in turn, is based upon equality of right."
>
> "Finally, the Inter-American Bar Association, at its conference in 1957, expressly recognising the 'equality of right' concept implicit in the resolution discussed above, agreed:
>
> > States having under their jurisdiction a part of a system on international waters are under a duty, in the application of the principles of equality of rights, to recognise the right of the other states having jurisdiction over a part of the system to share the benefits of the system.
>
> The Concurrence among lawyers and legal scholars that the international rivers cannot be the subject of exclusive appropriation by one state is persuasive, when considered with the overwhelming evidence discussed previously, that the limited sovereignty principle is a rule of international law."....(4)

3.2.14 It is, therefore, clear that 'limited territorial sovereignty' or the 'equitable apportionment theory' is now fairly established as an accepted rule of International Law.

3.2.15 Thus it is seen that under the 'Limited Territorial Sovereignty' theory, each State riparian to

(1) The Law of International Drainage Basins, edited by Olmstead & Ors., page 38.

(2) *Ibid*, page 18.

(3) Berber's, 'Rivers in International Law', 1959, p. 13.

(4) The Law of International Drainage Basins, edited by Olmstead etc., pages 25 to 37 and 37-38.

an international river has a right under International Law to utilise the waters of that river, which means the right of equitable utilisation or equitable apportionment. But at the same time this has introduced delicate and difficult problem as to how and to what extent each co-riparian state may share in the utilisation of waters as stated by Jerome Lipper:

> "....Indeed, it is difficult to formulate even general principles relating to equitable utilization since this concept does not lend itself to precise formulation. Moreover, in so far as international authority is concerned, the area is almost a virgin one. The conclusions reached with respect to the application of the principle of equitable utilization must, except where otherwise indicated, therefore constitute only a prediction of how an international tribunal seized of a particular dispute would resolve it....."(1)

3.2.16 It is, however, said, "that although the area of equitable utilisation may not lend itself to the formulation of precise rules, it is nevertheless, suitable for the formulation of general guiding principles. Lipper again states:

> "Stated somewhat differently, there are no mechanical formulas capable of application to all rivers and which, in every case when applied to a specific situation, will provide the correct allocation of the waters between the co-riparian states and a judicious resolution of conflicts among various uses of the waters. It is apparent, for example, that the needs of an arid Middle Eastern country for irrigation will not necessarily be fulfilled by applying solutions that have been successful in resolving disputes over hydroelectric power in the north-western United States or Canada, or in resolving a timber floating dispute in Scandinavia."....(2)

3.2.17 Although such is the position, attempts were made comparatively in recent times by the International Law Association in its Dubrovnik Conference in 1956, to formulate some guidelines but only with some limited success. It recommended that, "States upon an international river should in reaching agreements and states or tribunals in settling disputes... weigh the benefit to one state against the injury done to another through a particular use of the water. For this purpose, the following factors among others were recommended for taking into consideration:—

(a) The right of each to a reasonable use of the water.

(b) The extent of the dependence of each State upon the waters of that river.

(c) The comparative social and economic gains accruing to each and to the entire river community.

(d) Pre-existent appropriation of water by one State.

(e) Pre-existent agreements among the States concerned."

3.2.18 But this question as stated by Jerome Lipper left many problems unsolved.

3.2.19 It is stated that "the corner stone of equitable utilisation is equality of right. An eminent authority Prof. Andrassy has suggested that "(e) equality of rights should be construed to mean that riparian States have an equal right to use the waters of such waterway in accordance with their needs." This meaning accurately restates the principle that equality of right is not synonymous with equal division of the waters. It is deficient, however, in failing to consider equality of right not only from the point of view of 'needs' but more important, from the stand-point of conflicting needs. It is precisely because the water is often inadequate to satisfy the just needs of all that rules are required.(3)

3.2.20 In Kansas Vs. Colorado, the Supreme Court of United States concluded that the disputes must be adjusted upon the basis of equality of right as to secure as far as possible to Colorado the benefits of irrigation without depriving Kansas of the like beneficial effects of a flowing stream."(4)

3.2.21 But this principle of equality of right is elastic and varies with the varying circumstances of a given case. This is well illustrated in the case of Washington Vs. Oregon, where the Court determined that the diversion by Oregon of the entire surface flow of the Walla-Walla river during the periods of scarcity was not necessarily inconsistent with such equality. In the facts and circumstances of that case, the court could not find any benefit to Washington by division of the waters.....(5)

3.2.22 Now, the equality of rights will depend, it is clear, on the needs of each co-riparian state. Thus it may be assumed that in determining what is an equitable utilisation, needs of the co-riparian state could be considered and they are chiefly:

(i) examination of the economic and social needs of the co-riparian states by an objective consideration of various factors and conflicting elements relevant to their use of the waters;

(ii) Distribution of waters amongst co-riparian states in such a manner as to satisfy their needs to the greatest extent possible; and

(iii) accomplishment of the distribution of the waters by achieving the maximum benefit for each co-riparian consistent with the minimum of detriment to each.

3.2.23 The maximum benefit does not mean that the "use must be most beneficial to which the water

(1) The Law of International Drainage Basins, edited by Olmstead et al, pages 41-42.

(2) The Law of International Drainage Basins, edited by Olmstead et al, pages 41-42.

(3) The Law of International Drainage Basins, edited by Olmstead et al, pages 43-44.

(4) 206 US, p. 100 (1907).

(5) 291 US, p. 517 at 522 (1936).

could be put or that the method of utilisation is maximally efficient in minimizing waste of the water." As for instance, in Nebraska Vs. Wyoming, where plaintiff claimed that, by irrigation, it might produce more than Colorado produces with the same amount of water, the Court referred to the need to protect Colorado's established economy and concluded: "We are satisfied that a reduction in present Colorado uses is not warranted. The fact that the same amount of water might produce more in lower sections of the river is immaterial."....(1)

3.2.24 Almost similar view was taken in the Report of the Indus Commission (MR—36) where the Commission, *inter alia*, observed:

> "69. There is, however, another side to the picture. Undoubtedly, inundation canals are a wasteful anachronism and the sooner they are replaced by weir-controlled systems, the better. But many miles of such canals are still in existence (Sind has over 3,000 miles including distributaries) and large numbers of people have for generations depended upon them for their livelihood. It may be that they and their Province cannot yet afford to instal a better and, in the beginning more expensive system of irrigation. In the meantime, are they to be deprived of their living, merely because an upper Province needs the water? If the upper province wishes to take the water let it pay adequate compensation in cash or in kind."....(2)

3.2.25 In the above case, question involved was one of established use. There seems to be no authority for the proposition as to whether the result would be same should a State seek to introduce a new use. But in such a new situation, as stated, by Lipper, "it would appear that a Tribunal, keeping in mind that the crucial test is 'need', would take a less than optimum proposed utilisation into account along with other relevant factors in determining whether, or the extent to which, such a use will be permitted."

3.2.26 Granted a beneficial use, it must then be determined "(i) whether the use interferes with a beneficial use in another state, (ii) if such interference is found to exist, the extent of the interference with the conflicting use, and (iii) the extent to which the uses can be reconciled, and if they cannot be, which use will prevail." This, however, should be determined on the facts and circumstances of each case. It is neither possible nor desirable to contemplate all the contingencies that may come up in different situations of different rivers. Each case has to be judged on its own facts and the principles of equitable apportionment is such that it would be futile to reduce it into fixed formula or rules. As Mr. Justice Holmes observed, "The effort always is to secure an equitable apportionment without quibbling over formulas."....(3).

3.2.27 In this case, the court observed that, "in order to compare the amount of this detriment with the great benefit which has obviously resulted to the counties in Colorado, it would seem that equality of right and equality between the two States forbids any interference with the present withdrawal of water in Colorado for the purposes of irrigation."

3.2.28 Commenting upon the above two cases, Lipper again states:

> "It is clear that the Court went through a weighing and balancing process in reaching its decision."
>
> "The Colorado case also introduces what may be called the 'net injury' principles, which requires an examination of the net effects of a diversion on the territory of a co-riparian, rather than limiting the examination only to the effects on any particular area or tract of land in determining the reasonableness of a diversion. The Court while noting that certain Kansas land had been deprived of water, observed that other Kansas land was receiving a benefit from the Colorado diversions. Thus, the injury was, in effect, cancelled out, despite the fact that the benefit to Kansas from the river had territorially changed."
>
> "Although the Colorado case applied the 'net injury' principle to similar uses in the territories of the co-riparian states, the rationale of the Court indicates that the same principle would be applicable in a case involving disparate and conflicting uses in such states."(4)

3.2.29 Thus it is seen that equitable utilisation is a balancing process and in case of conflicting uses 'net injury' principle has to be applied in distributing fair share of water to each of the co-riparian states.

3.2.30 It is already noticed that in spite of difficulties inherent in the problem broad guidelines and certain fundamental principles have been evolved. But the problem still remains, for, in spite of the guidelines it is not easy to work out equitable share of each basin State as no two cases of water dispute relating to international or inter state river can be similar. To cope with these difficulties attempts have been made from time to time to lay down certain guidelines for adjudication of International Water Disputes. In 1966 International Law Association has framed certain Rules(5) applicable to the use of the waters of an international drainage basin. The relevant rules are as under:—

Article II

> An international drainage basin is a geographical area extending over two or more States determined by the watershed limits of the system of waters, including surface and underground waters, flowing into a common terminus.

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(1) 325 US, p. 589 at 621 (1945).

(2) Report of the Indus Commission (MR-36), p. 52, para 69.

(3) 283 US, p. 336, 343 (1931). Also see 206 US, p. 46 (1907).

(4) The Law of International Drainage Basins, edited by Olmstead et al, pages 48-49.

(5) The Helsinki Rules, 1966.

Article III

A "basin State" is a state the territory of which includes a portion of an international drainage basin.

Article IV

Each basin State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin.

Article V

(1) What is a reasonable and equitable share within the meaning of Article IV is to be determined in the light of all the relevant factors in each particular case.

(2) Relevant factors which are to be considered include, but are not limited to:

(a) the geography of the basin, including in particular the extent of the drainage area in the territory of each basin state;

(b) the hydrology of the basin, including in particular the contribution of water by each basin State;

(c) the climate affecting the basin;

(d) the past utilization of the waters of the basin, including in particular existing utilization;

(e) the economic and social needs of each basin State;

(f) the population dependent on the waters of the basin in each basin State;

(g) the comparative costs of alternative means of satisfying the economic and social needs of each basin State;

(h) the availability of other resources;

(i) the avoidance of unnecessary waste in the utilization of waters of the basin;

(j) the practicability of compensation to one or more of the co-basin States as a means of adjusting conflicts among uses; and

(k) the degree to which the needs of a basin State may be satisfied, without causing substantial injury to a co-basin State;

(3) The weight to be given to each factor is to be determined by its importance in comparison with that of other relevant factors. In determining what is a reasonable and equitable share, all relevant factors are tobe considered together and a conclusion reached on the basis of the whole.

3.2.31 It appears from the provisions of Article V that the relevant factors which are to be considered for determining reasonable and equitable share are illustrative and not exhaustive for it is clear from the provisions of Sub-Article (2) that the relevant factors which are to be considered are not limited to those factors mentioned in Clause (a) to (k). There may be other relevant factors which would require consideration in the facts and circumstances of a given case.

3.2.32 Then again, all the factors mentioned in Clause (a) to (k) of Sub-Article (2) may not be considered as important for under sub-Article (3) considering the relative importance of the relevant factors weight is to be given to some factors. This is an over-riding Clause which regulates the process for determination of reasonable and equitable share by attaching weight to various competing claims and considering relative importance of the relevant factors as mentioned in Clause (a) to (h) in sub-Article (2). In other words all important factors are to be considered together and on such consideration a conclusion ought to be reached. Here again there is no guideline or set pattern as to how and on what basis weight has to be given to each factor for determination of their respective importance. This clearly will depend upon individual judgement. Thus, though determination has to be made on objective basis much is left to the discretion of the concerned authority.

Decision of the Supreme Court of United States

3.2.33 As already noticed, the theory of equitable apportionment has been applied by Courts and Tribunals in adjudicating inter-state water disputes in United States of America and other foreign countries. In a long line of cases Supreme Court of the United States has adopted and applied the principles of equitable apportionment in water disputes between different States within its federation. In one of the earliest decisions of the Supreme Court 'Kansas *versus* Colorado'. . . . (1) the Supreme Court enunciated and applied the doctrine of equitable apportionment. It observed "the dispute must be adjusted upon the basis of equality of rights as to secure as far as possible to Colorado the benefits of irrigation without depriving Kansas of the like beneficial effects of a flowing stream".

3.2.34 This doctrine of equitable apportionment was reaffirmed in "Wyoming *versus* Colorado". (2) In this case Wyoming sought for an injunction restraining Colorado corporations from diverting water from the Laramie river which rose in Colorado and crossed into Wyoming. As such diversion would have damaged prior users down stream Wyoming—the court emphasised and applied the doctrine of prior appropriation and observed that in the circumstances "the doctrine of prior appropriation furnished the only basis which is consonant with the principles of right and equality applicable to such a controversy as this is".

(1) 206 US p. 46 (1907).

(2) 259 US p. 419 (1922).

3.2.35 In the next case 'Connecticut *versus* Massachusetts(1) the Supreme Court of America again recognised and applied the principle of equitable apportionment although the two States concerned recognised within their borders the common law doctrine of riparian rights.

3.2.36 In the next case of New Jersy *versus* New York(2) Mr. Justice Holmes made the legal position clear and expressed himself as follows:—

> "A river is more than an amenity, it is a treasure. It offers a necessity of life that must be rationed amongst those who have power over it. The different traditions and practices in different parts of the country may lead to varying results but the effort always is to secure an equitable apportionment without quibbling over formulas."

3.2.37 It is not necessary to multiply cases as by now it is well established that doctrine of equitable apportionment as rule of International Law is well recognised and made applicable to inter-State water disputes. There is no dispute now that this theory of equitable apportionment has been approved and followed in India. In the report(3) of the Indus Commission there has been discussion in some details on the law and legal principles applicable to inter-State water disputes and on a review of principles laid down in some of leading decisions of the Supreme Court of the United States of America and other foreign judgements it has been observed *inter alia* as follows:—

> "A third principle that has been advocated is that of "equitable apportionment" that is to say, that every riparian State is entitled to a fair share of the waters of an inter-State river. What is a fair share must depend on the circumstances of each case, but the river is for the common benefit of the whole community through whose territories it flows, even though those territories may be divided by political frontiers."

3.2.38 Rule of "equitable apportionment" consistently applied in America. In all the American cases that we have mentioned, the Court has consistently applied the third of these principles, that is to say, the principle of "equitable apportionment".

3.2.39 In a comparatively recent inter-State water dispute of Krishna river the Tribunal has taken the same view and applied the law or legal principles of equitable apportionment.... (4)

3.2.40 In fact there is no dispute now between the concerned party States over the application of the law of equitable apportionment to the instant Narmada water disputes before us.

3.2.41 It is conceded by Madhya Pradesh that "in the present case the principle of equitable apportionment is legal principle to be applied to the extent it is applicable and not the hormon doctrine" but at the same time it is stated that Madhya Pradesh does not concur with the qualifying Clause recorded in the preliminary judgement to the effect that "the applicable principle is the doctrine of equitable apportionment as enunciated by the Indus Commission in paragraphs 14, 16, 27 and 51 Vol. I of its report".... (5)

The Contentions of Madhya Pradesh

3.2.42 The broad contentions of Madhya Pradesh on the scope, effect and implication of law and legal principles of equitable apportionment are as under:.... (6)

(i) "....The river basin, or the drainage basin, as known to international law, is the basic and natural hydro-economic and legal unit for apportionment. Equitable apportionment must, therefore, be made on the basis of factors pertaining to and confined to the basin.

(ii) The flow of such tributaries of an inter-State river as do not bear an inter-State character and lie wholly within one State should be wholly allocated to the State in which they flow.

(iii) Diversion of waters outside the basin is illegal and impermissible in making equitable apportionment. Without prejudice to this contention and in the alternative, in the event outside basin diversion is held to be legal and is allowed, such diversion should be limited to the surplus waters available after liberally providing for the basin needs. Such outside basin diversion, when allowed, should be confined to areas where there is a great need for water and, in particular, where the claim is for irrigation, the need and capability of use of the waters for irrigation is established.

3.2.43 In support of its first contention, Madhya Pradesh has relied on the Resolution of the International Law Association in Dubrovnik Conference held in 1956. New York Resolution, 1958 and 'Helsinki Rules' passed by the International Law Association at its 52nd Conference in 1966. Madhya Pradesh also relies on the opinions expressed by members of the International Law Association in its proceedings in the 52nd Conference, prior to adoption of the Helsinki Rules and submits that they all support the river basin or the drainage basin concept theory.

3.2.44 Reliance is also placed on the opinions of Prof. Teclaff, Olmstead, H.A. Smith and a number of

(1) 282 US p. 660 (1931).
(2) 282 US p. 336 (1931).
(3) MR-36—Report of the Indus Commission page 33.
(4) Krishan Water Disputes Tribunal report Chapter XI, Vol. I (Cyclostyled copy).
(5) MP Written Submission Vol. XIV, p. 5.
(6) MP Written Submission Vol. XIV, pp. 1-2.

other commentators and publicists. It is said that Prof. Teclaff has pointed out: (1)

> "The concept of an entire river basin as the basic unit for water resources development is now widely accepted. It has gained ground steadily since the turn of the century, and even before that, when the nature and scope of their hydraulic unity was not yet understood and conceptualised, many river basins can be shown to have possessed the character of legal and economic units." (Olmstead et. al. page 609)

3.2.45 Madhya Pradesh submits that on the opinion expressed by these very high authorities, it is clear that fundamental unity of river basin and its recognition as a legal entity has been accepted.

3.2.46 Madhya Pardesh has cited a number of acts and enactments to show that the river basin has been accorded statutory recognition and accepted as a legal entity. It is submitted that the concern of Congress, the State Legislatures as well as the federal of the State Courts in United States has been to protect the river basin, otherwise called the area of origin and to prohibit trans-basin diversion except for enumerated uses such as municipal and industrial water supply.

3.2.47 As regards the first part of contention No. (iii) *viz.* that diversion of waters outside the basin is illegal and impermissible in making the equitable apportionment, it seems, it is a necessary corollary of the first contention. Madhya Pradesh submits that to treat claims for extra basin in common with basin requirements and to decide the equitable share on that basis would be to virtually nullify the basin concept. There is no warrant either in international law or Indian law for such basis. Such an approach overlooks the very basis of the Inter-State Water Disputes Act, 1956, and the River Boards Act, 1956, which are *ex-facie* concerned respectively with the adjudication of disputes relating to the use, distribution or control of water of or in any Inter-State river or river valley and development of the river basin involved.

3.2.48 Madhya Pradesh State in support of its contention has relied on several decisions of the United States Supreme Court, namely, (i) Kansas *Vs.* Colorado (206 US page 46), (ii) Wyoming *Vs.* Colorado (259 US 419 at 465), (iii) Connecticut *Vs.* Massachussetts (282 US 660) and submitted that the disputes are to be settled on the basis of equality of right, but that does not necessarily mean the equal division of waters. It is submitted that inferentially, it follows that even for a riparian State, it is only the needs within the basin that can form the basis for assertion of rights for equitable apportionment and not areas outside the basin within the State.

Contentions of Gujarat

3.2.49 Gujarat, on the other hand, contends that drainage basin concept is not warranted under the law of equitable apportionment. Gujarat, on its turn, relies again on the opinions of various commentaters and publicists.

3.2.50 From the rival contentions of the party States on this aspect of the matter, it is clear that there is great divergence of opinion on the question of the basin concept or protection of area of origin theory. In assessing the value of the writing of these international jurists, Oppenheim states, "In pleadings before International Tribunals, the disputants still fortify their arguments by reference to writings of international jurists, but with the growth of international judicial activity and of the practice of States evidenced by widely accessible records and reports, it is natural that reliance on the authority of writers as evidence of International Law should tend to diminish. For it is as evidence of the law and not as a law-creating factor that the usefulness of suitable teachings of writers has been occasionally admitted in judicial pronouncements.". . (2)* This being so, it will not be proper to come to any conclusion solely relying on the opinion of these writers particularly when their opinions appear to be conflicting.

3.5.51 In the New York Resolution, 1958, referred to by Madhya Pradesh, U.S. delegate Mr. A. M. Hirsch commented, "there may be situations in which both the basins of a river and adioining basins can profit more from a trans-basin diversion than from development confined to the basin alone. . . ." He argued, "if technology makes it possible to bring waters from one basin to another, such diversion should, of course, be subject to all the principles, which are contained in the Committee's report. However, to my views, while we should designate the basin as the normal unit of hydro-economic development and organisation we should not recommend away all reasonable possibilities of trans-basin development." . . . . . (3)

3.2.52 Prof. C. B. Bourne, who also took part in the International Law Association in New York in 1958, expressed his opinion and spoke against the acceptance of basin concept theory. He said, "in determining what is an equitable share in the waters of a river, most relevant factor is the use that can be made of it by the riparian States and so diversions to or from a river system ought to be embraced in this definition.". . . . . (4)

3.2.53 The Resolution No. 1 of the New York Conference states "a system of rivers and lakes in a drainage basin should be treated as an integrated whole (and not piecemeal)."

3.2.54 From the language of the Resolution, it is difficult to see how the drainage basin theory is accep-

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(1) MP Written Submission Vol. XIV, page 27.

(2) International Law—A Treatise by L. Oppenheim Vol. I (8th Edn.) p. 33 (Without Footnotes)*.

(3) Gujarat Written Reply Vol. 37, pp. 18-19.

(4) The Dev. of International Water Resources; Drainage Basin p. 66.

ted as a part of the law of equitable apportionment. In any case, this was not discussed in subsequent conferences of the Law Association, nor does it find a place in the proceedings of the Conference which adopted the Helsinki Rules.

3.2.55 The decisions of the United States' Supreme Court do not support the basin concept theory advanced by Madhya Pradesh. The case of Kansas *Vs.* Colorado(1) was a case of "prior appropriation". Both Kansas and Colorado claimed waters of Arkansas for irrigation in the Arkansas basin and no question of relative right of basin area and extra basin area arose for decision in that case. Supreme Court upheld Colorado's claim as it found, though the appropriation of the waters of the Arkansas by Colorado has diminished the flow of water into State of Kansas, having regard to the development made by Colorado by reclamation of large areas in Colorado and transforming thousands of acres into fertile fields, the detriment caused to Arkansas valley was little and, therefore, Kansas was not entitled to decree.

3.2.56 In 'Wyoming *Vs.* Colorado'.....(2), Wyoming filed a suit to prevent a proposed diversion in Colorado of part of the waters of Laramei on the allegation that the proposed diversion would take a substantial part of the waters of that river for use in another drainage basin in Colorado and thus would cause damages to prior users down stream in Wyoming. The Court held *inter alia*, that the objection of the Wyoming of the proposed diversion on the ground that it is to another water shed from which, she can receive no benefit, is also untenable. The fact that the diversion is to such a water shed does not in itself constitute a ground for condemning it. In neither state thus the right of appropriation depends upon the place of use being within the same water shed. The diversions from one water shed to another are commonly made in both states and the practices recognised by the decisions of their courts.

3.2.57 In the subsequent case between the same parties relating to the same river Supreme Court took the same view and observed that transport of water into another shed was permissible and the question how it is diverted was not material.

3.2.58 Without multiplying cases, it would be sufficient to state that in New Jersey *Vs.* New York,(3) Mr. Justice Holmes clarified the legal position and expressed himself as follows:—

> "The removal of water to a different water shed obviously must be allowed at times unless states are being deprived of the most beneficial use on formal grounds."

3.2.59 Reliance is placed on some legislations of United States of America such as:—

(i) Water Resources Planning Act, 1965.

(ii) Water Restoration Act.

(iii) The Colorado Basin Project Act, 1968.

3.2.60 Gujarat contends that nothing in these Acts indicate any limitation on the rights of States with respect to use of water of inter-State rivers. But this apart, I think, it will not be proper to introduce or apply these Acts as a part of established Rule of International Law in equitable apportionment of water in inter-State Water Disputes even if basin concept or theory of protection of area of origin is recognised in these legislations.

3.2.61 Reference was also made to certain International or Inter-State Treaties and compacts such as:—

(a) The Colorado River Compact, 1922.

(b) The Mexico Treaty, 1944.

3.2.62 These treaties are by their very nature operative between the States who are parties thereto and not outside. In any case they cannot be applied as a source of established principles of International Law laying down broad proposition accepting basin as a legal entity in matters relating to adjudication of inter-State Water Disputes in India.

3.2.63 Reliance was placed on Helsinki Rules particularly Articles I, II and III and it is urged that having regard to the scope, effect and implications of these Rules the basin needs must be satisfied first and surplus, if there be any, may be transported for extra basin needs. On proper and correct interpretation of these Articles, it is difficult to accept this contention as correct. In Article I, it is provided that the general Rules of International Law as set forth are applicable to the use of waters of an International Drainage basin. Clearly, there is nothing to indicate that use of the waters must be confined to International Drainage basin. Article II only defines an International Drainage basin. Article III defines a basin state, "as a state the territory of which includes a portion of international drainage basin." It is clear that the definitions by themselves do not impose any territorial limitation on the use of the waters of international drainage basin. On the other hand, Article IV provides as under:—

> "Each basin State is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin."

3.2.64 This Article expressly provides that each basin state is entitled to beneficial use of the water of international drainage basin within its territory. Such use clearly is not limited or confined within that part of the territory covered by the International Drainage Basin.

3.2.65 It will be seen from the report of the 52nd Conference of the International Law Association that Prof. Olmstead pointed out, "there is an error or omission of some significance, Article IV at page 10 of the Committee Report, should include the words, 'within its territory' so that it reads: "Each basin

(1) 206 US pp. 46, 100 and 101.

(2) 259 US p. 419 (1931).

(3) 283 US p. 336.

state is entitled within its territory to reasonable and equitable share in the beneficial use of the waters of the International Drainage Basin."

3.2.66 Dr. Gamal M. Badr (Algeria) proposed that there was need of explicit mention about the illegality of the diversion of waters beyond the geographical limits of the drainage basin but after a full debate in the matter the proposal of Dr. Badr was not accepted.

3.2.67 Then again, Article V of Helsinki Rules provides for determination of reasonable and equitable share within the meaning of Article IV, considering the relevant factors enumerated in sub-Article (2) (a) to (k) of Article V, of the Rules. No doubt, the geography and hydrology of the basin or the climate affecting the basin are relevant factors, but merely because these factors are to be considered as relevant factors, that would not certainly mean that reasonable and equitable share in the beneficial use of the water must be confined to the basin and not beyond. In my view Article IV read with Article V, makes it abundantly clear that reasonable and equitable share in the beneficial use of waters of an international drainage basin need not be confined to the basin needs. This Rule also does not indicate that only surplus water after satisfying the needs of the basin can be transported beyond the basin.

3.2.68 As regards the contentions (ii) of Madhya Pradesh, the question is whether in a water dispute involving equitable apportionment the flows of tributaries which lie only within one state must necessarily be *ipso facto* part of the share of the state in which they lie.

3.2.69 It appears that by the joint agreement (1) the four States agreed that the quantity of water in Narmada available for 75 per cent of the year is 28.00 MAF and this quantum is to be distributed among the four States. It is clear that in determining such quantum of water the contribution of all tributaries whether wholly within one state or not were taken into consideration and no exclusive and separate claim was made by Madhya Pradesh on account of the waters of these tributaries running within its State.

3.2.70 Thus, it is also an admitted fact that out of the said 28 MAF of waters, Rajasthan was given 0.5 MAF and Maharashtra 0.25 MAF.

3.2.71 It also appears that agreed yield series(2) at Mortaka and Garudeshwar were prepared by taking into account contributions of the inter-State tributaries.

3.2.72 Madhya Pradesh State has also not produced any data relating to the yield of tributaries wholly within its State. Upon these facts, clearly, Madhya Pradesh is not entitled to claim exclusively the contribution made by the flows of all the tributaries in its State in equitable apportionment of Narmada waters between Madhya Pradesh and Gujarat.

3.2.73 Madhya Pradesh has relied on Article 262 of the Constitution of India and Inter-State Water Disputes Act, 1956. I will consider later these provisions of the Constitution or Inter-State Water Disputes Act as referred to by Madhya Pradesh.

3.2.74 There is nothing either to indicate from the views expressed in the Irrigation Commission's Report, (3) Maharashtra Irrigation Commission's Report (4) and the Indian Law Institute publication as relied on by Madhya Pradesh that the flows of the tributaries which lie wholly within one state must necessarily be allocated entirely to that State in equitable apportionment. On the contrary, in the Law Institute publication (Inter-State Water Disputes in India), the opinion is that the total river flow of the main river is contributed by all its tributaries and therefore, the tributaries are to be regarded as a part of the inter-State river.

3.2.75 Madhya Pradesh has relied on decision of the Supreme Court of the United States 'New Jersey *Vs.* New York'(5), where Mr. Justice Holmes observed "a river is more than an amenity, it is a treasure. It offers a necessity of life that must be rationed among those who have power over it." Madhya Pradesh seems to have sought support of its tributary concept from the words "who have power over it." Gujarat argues, I think rightly, that words "who have power over it", was intended to apply to the river as a whole and not separately to a section or a reach of a river or a tributary. Madhya Pradesh also has relied on another Supreme Court Decision of the United States Arizona *Vs.* Colorado(6). This case involves the interpretation of the Boulder Canayon Project Act passed by Congress in 1928. It was *inter alia* observed—"But more importantly the negotiations among the State and the Congressional debates leading to the passage of Project Act clearly show that the language used by Congress in the Act was meant to refer to main stream waters only. Inclusion of the tributaries in the Compact was natural in view of the upper States strong feeling that the lower basin tributary should be made to share the burden of any obligation to deliver water to Mexico which the future treaty might impose. But when it came to an apportionment among the lower basin state the Gila by far the most important lower basin tributary would not logically be included since Arizona alone of the states could effectively use the river". It is, therefore, clear that this case is of no assistance to Madhya Pradesh State in its claim of waters of all the tributaries of Narmada exclusively lying within Madhya Pradesh State. This contention of Madhya Pradesh, therefore, cannot be accepted.

3.2.76 As regards contention (iii) of Madhya Pradesh, it is already noticed that first part thereof,

(1) Exhibit C-1.
(2) Exhibit C-2.
(3) G-512.
(4) MR-23.
(5) 283 US pp. 336 to 342.
(6) 373 US p. 546.

namely, 'diversion of waters outside the basin is illegal and impermissible in making equitable apportionment' is a necessary corollary of first contention of Madhya Pradesh. So, the alternative contention in substance is that even if diversion of waters outside basin is allowed, such diversion should be limited to the surplus waters after satisfying the in-basin needs, and also should be confined to areas where there is great need for water and the capability of use of the waters for irrigation is established.

Contentions of Maharashtra

3.2.77 Maharashtra has supported Madhya Pradesh. Broad contention of Maharashtra is "that the legal principle that would be applicable when waters of an inter-State river have to be rationed as aforesaid is that the '*Basin needs*' of the riparian States must first be satisfied and it is only if there is a surplus, that the waters can be diverted for non-basin uses. Non-basin use and needs should always be considered subordinate to the basin requirements."(1)

3.2.78 Maharashtra contends that "the rationing, i.e., equitable apportionment has to be done or decided upon some accepted principle and not on ad-hoc formula or *ex acquo et bono*."

3.2.79 It is nobody's case that the allocation of Narmada Waters for consumptive use between Madhya Pradesh and Gujarat should be done *ex acquo et bono*. There is also no dispute that the rights of co-basin States in the beneficial uses of Narmada waters have to be on certain principles. In the instant case, it is agreed that the water has to be allocated on the basis of law and legal principles of equitable apportionment.

3.2.80 Reliance is placed on certain Indian legislations, e.g.,

(i) Article 262 of the Constitution of India; (Entry 56 of the Union List and Entry 17 of the State List)

(ii) Inter-State Water Disputes Act, 1956;

(iii) The River Boards Act, 1956; and

(iv) Damodar Valley Corporation Act.

3.2.81 Article 262(1) of the Constitution provides, "Parliament may, by law, provide for adjudication of any dispute or complaint with respect to the use, distribution or control of the waters of or in any inter-State river or river valley."

3.2.82 It is contended that on a proper and correct interpretation of the above provisions, 'use, distribution or control of waters' must be confined in the river valley or at any rate needs of the valley must be first satisfied.

3.2.83 The same interpretation also applies to the disputes arising between the concerned states, under the Inter-State Water Disputes Act, 1956. I fail to see how this is so.

3.2.84 On a fair reading of the provisions of both the Article 262 (1) and Section 2(C) and 3 of the Inter-State Water Disputes Act, 1956, it seems clear that there is nothing to indicate that use, distribution or control of the waters of the inter-State river or river valley are required to be confined to the river or its valley. Plainly, the words 'use, distribution or control' relate to waters of or in any inter-State river and river valley. This provision by no means can indicate that such use, distribution or control of water must be confined to the river valley.

3.2.85 Entry 56 of the Union List read with Entry 17 of the State List cannot be construed to mean that they put any such restriction expressly or by necessary implication that water by inter-State river or river valley cannot be transported beyond the basin area of the concerned inter-State river.

3.2.86 Entry 56 of the Union List is in these terms—"Regulation and development of inter-State rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by Parliament by law to be expedient in the public interest".

3.2.87 Entry 17 of the State List reads as under:—

> "Water i.e. water supplies, irrigation, canals drainage and embankments, water storage and water power subject to the provisions of Entry 56 of List I".

3.2.88 It is contended, Parliament's power of legislation under Entry 56 restricts the freedom of State Legislature to exercise their legislative rights under Entry 17, with regard to water i.e. water supplies, irrigation and canals, drainage water storage, water power etc.

3.2.89 Since Parliament, by law, can regulate and develop inter-State rivers and river valleys in the public interest, then by necessary implication, the State would be incompetent to legislate on water of the inter-State rivers or river valleys for the purposes mentioned in Entry 17 of the State List in any place also outside the same inter-State rivers and river valleys. The argument is that if there is any such legislation by the Parliament of any inter-State rivers or river valleys under Entry 56, then the water of the inter-State rivers and river valleys would be necessarily confined to the river valleys and, therefore, the State has no power to use the same water of inter-State rivers and river valleys in any place outside such inter-State valleys.

3.2.90 In my view whether or not such restriction is there, will depend upon the terms of the declaration and provisions of legislation. Entry 56, by itself, clearly 'does not put any such restriction'.

3.2.91 Maharashtra then referred to River Boards Act and particularly to Sections 4, 13, 14 and 15 of the River Boards Act.

3.2.92 It is difficult to see how these provisions are of any assistance to Madhya Pradesh or Maharashtra. The scheme of the Act as appears is that the Central Government may establish a River Board for advising the Governments interested in relation to such matters

(1) MR Note No. 51, page 45 (Vol. 9, part I).

concerning the regulation or development of a inter-State river or river valley or any specified part thereof as may be specified in the Notification and different Boards may be established for different inter-State rivers or river valleys. Every Board then shall exercise its jurisdiction with such limits of the river or river valley as the case may be and the areas specified by notification shall be called the area of operation of the Board. It is fairly clear that these provisions do not necessarily mean that the water resources would be restricted in its application only at the first instance to the river valley and only surplus water if there be any, can be taken outside the valley. The scheme of development of the river valley may involve as well transportation of water for beneficial use to places outside the river valley. In any case, the River Boards Act is a separate enactment and covers a field which has no connection or concern with the Inter-State Water Disputes Act. It is well settled, "(1) in the interpretation of statutes the courts decline to consider other statutes proceeding on different lines and including different provisions, or the judicial decisions thereon. Thus In Re: Lord Gerard's Settled Estate, the Court of Appeal held that the Settled Land Acts formed a code applicable to the subject matter with which they dealt, and that a decision on the Lands Clauses Act, 1845, was not applicable for their interpretation, because that Act was passed *alio intuitu*, and dealt with a different subject matter. Lord Macnaghten, when discussing the phraseology of two Revenue Acts, said in Inland Revenue Commissioner *Vs.* Forrest: "The two Acts differ widely in their scope; and even when they happen to deal with the same subject their wording is not the same. It was argued, indeed that the language was "practically identical; but that expression, to my mind, involves an admission that the language is different" and in 1955 Lord Reid said, "It does not necessarily follow that if parliament uses the same words in quite a different context they must retain the same meaning." So, this Act cannot be sought to supplement the provisions of Inter-State Water Disputes Act, which deals with different subject matter namely adjudication of disputes relating to distribution, use and control of waters of inter-State river or river valleys.

3.2.93 The same reasons will apply to arguments of Maharashtra seeking its support from Damodar Valley Corporation Act. Reliance is also placed on the reports of Krishna Water Disputes Tribunal and it is contended that the law in India is not different from the area of origin or the basin as a priority of scheme against the possible needs of the areas outside the basin. Krishna Water Disputes Tribunal has, it appears, held, among other things, that "the diversion of water of an inter-State river outside the river basin is legal". As regards the permissible limits of diversions to another water shed, the Tribunal observed, "though in out of basin diversion, needs may be relevant in determining a State's equitable share, the weight to be given to them depends upon the circumstances of each case. Each river basin has its own peculiar problem and there is no set of rigid norms that can be applied to all river systems under all circumstances."(2)

3.2.94 Maharashtra has also referred to the United States Water Resources Planning Act and Colorado River Basin Project Act, 1968 and submitted that for planning basin development is a recognised concept and, therefore, the area of origin would require protection.

3.2.95 I have already considered these Acts and in my view, it would not be proper to introduce or to apply the provisions of these American legislation in India with regard to Inter-State Water Disputes where conditions are different even if the basin concept theory or protection of area or original theory is recognised in these statutes.

3.2.96 On facts also, Madhya Pradesh and Maharashtra seem to have no case. The admitted position is that by virtue of joint agreements (C-1), Madhya Pradesh and Maharashtra agree to the allocation of 0.5 MAF of water from Narmada Waters to Rajasthan for irrigating some of the border areas of Rajasthan State. It is clear that this water has to be carried by canal almost to the border of Rajasthan, far away from the boundary of Narmada basin in Madhya Pradesh or in Gujarat. In other words, Madhya Pradesh and Maharashtra agree to such diversion of water beyond basin to irrigate lands in Rajasthan.

3.2.97 It is true that Madhya Pradesh and Maharashtra argued for delivery of this quantity of 0.5 MAF of waters to Rajasthan from Mahi river through high level Kadana canal, but this has been found to be unacceptable.

3.2.98 The other fact is that the Madhya Pradesh State itself has pleaded for extra-basin diversion for irrigating some areas in upper reaches of Narmada in the Durg and Bilaspur districts in Madhya Pradesh. Madhya Pradesh has claimed that even if the basin requirements in Madhya Pradesh are not satisfied with the amount of water that may be allocated to it, then also water requirements for irrigating this extra-basin areas should be allowed. This, being the position Madhya Pradesh State cannot at the same time, turn round and oppose the Gujarat's scheme of trans-basin diversion of Narmada water for irrigation.

3.2.99 All the contentions raised by Madhya Pradesh and Maharashtra, therefore, must fail.

3.2.100 I may mention that law or legal principles of equitable apportionment has been discussed in great detail in Chapter 8 of Volume I of the Report. The contentions raised by Madhya Pradesh and Maharashtra have been considered and rejected in Chapter 9 of the same volume. In the view, I have taken, I have reached the same conclusion.

Ground Water Resources

3.2.101 In the above background, the question is what are the relevant factors that should be taken into

(1) Craies on Statutes Law, 6th edition p. 133 (without foot notes).

(2) Report of the Krishna Water Disputes Tribunal pp. 402—405.

consideration for equitable apportionment of the water as between the rival States.

3.2.102 Following the law and legal principles for equitable apportionment of an inter-State river system, the underground water resources of a State is a relevant factor for this may furnish alternative means for satisfying the irrigation needs of a State. Nevertheless, there is practical difficulty in the matter as the ground water flow cannot be measured with accuracy and therefore, there cannot be a proper legal basis for inclusion of under ground water in the equitable apportionment. This matter has been discussed in some detail in Volume I, Chapter IX paras 9.16 and 9.17 of the Report.

3.2.103 Following the legal interpretations, reasons and the conclusions made therein, I am inclined to hold that ground water estimates of the party States should be excluded altogether in making equitable apportionment of the water as between the party States.

3.2.104 Both Madhya Pradesh and Gujarat by application of Article 5 of Helsinki Rule have estimated allocation of water on the basis of their own statistics.(1) But these respective estimates have produced rather curious results. There is a great difference between the estimates of either side.

3.2.105 Madhya Pradesh has shown in the statement that based on the statistics of all the relevant factors Madhya Pradesh State would be entitled to get 25.9 MAF of water and Gujarat 1.35 MAF of water.

3.2.106 On the other hand Gujarat has shown on its own statistics that Gujarat would get 18.56 MAF and Madhya Pradesh 8.69 MAF out of the balance quantity of water of 27.25 MAF. Both Madhya Pradesh and Gujarat States have made elaborate arguments and counter arguments to justify their respective estimates.

3.2.107 In such circumstances, it is not possible to apportion the water between these two party States on the basis of such estimates. Clearly, such a procedure for apportionment of water cannot be accepted.

3.2.108 As already noticed the guiding principle which should be accepted is that in determining what is a reasonable and equitable share the weight is to be given to some of the relevant factors which would appear to be important in comparison with that of the other relevant factors in the facts and circumstances of a given case.

3.2.109 This being so in the facts and circumstances revealed in the instant case and on the basis of the law and legal principles of equitable apportionment weight should be given to more important factors and such important factors among others which ought to be considered are:—

(a) the Culturable Area of the State;

(b) Population dependent on the water of basin in each State;

(c) Drought areas in each State; and

(d) Economic needs including irrigation requirements of each State.

3.2.110 Particulars of Statewise figures, culturable area, net sown area, population dependent on agriculture and drought area, and population affected by drought of both Gujarat and Madhya Pradesh are given below:—

	Gujarat	%	Madhya Pradesh	%
1* Culturable area (in lakh acres)	297·31	31·1	629·21	68·9
2* Net sown area (in lakh acres)	232·59	29·48	453·21	70·52
3* Population dependent on agriculture (In thousands)	5509	31·75	12147	68·25
4@ Drought area (In thousands)	17463	72·72	10102	27·28
5@ Population affected by drought (In thousands)	5480	72·16	3070	21·84

3.2.111 Thus in the background of the law and legal principles of equitable apportionment, the question ultimately resolves itself really into one of facts.

ALLOCATION OF NARMADA WATER BETWEEN GUJARAT AND MADHYA PRADESH

3.3.1 This being the position, it is already noticed, that Gujarat's claim for water from Narmada for Mahi Command cannot be accepted.

3.3.2 As regards the claim of water for 6.36 MAF on account of area in Banni, Great Rann (Northern Border and Eastern Border) and Little Rann, on the basis of CCA of 11.03 lakh acres, I have determined that Gujarat should be given water for Banni (2.28 lakh acres) and for Little Rann (2.00 lakh acres), which comes to 2.47 MAF from the Narmada river for these areas. It is not necessary for me to repeat again my reasons for making such allowances of water on account of these areas.

3.3.3 As regards zones I to XI, I have determined that Gujarat is entitled to get 10.92 MAF of Narmada waters for irrigation.

3.3.4 Over and above, Gujarat is entitled to 1.06 MAF of water on account of domestic and industrial uses.

3.3.5 Gujarat's claim for releases below Navagam has not been allowed.

3.3.6 So after deducting 0.282 MAF of water on account of en route rivers from the total requirements

(1) MP Statement No. 2 and Gujarat's Statement No. 42.

* See MP/547.

@ Irrigation Commission Report (G-512 Vol. I p. 166—1972).

of Gujarat, Gujarat's total requirement of Narmada waters would come to as under:—

Zones I to XI . . .	10·92 MAF
Banni & Little Rann . . .	2·47 MAF
Domestic & Industrial use .	1·06 MAF
Total . . .	14·45 MAF
Deduct, on account of enroute rivers:	(—)0·282 MAF
	14·168 MAF
Rounded off to . . .	14·17 MAF
So Gujarat's total requirement :	14·17 MAF

3.3.7 As regards Madhya Pradesh's requirements of water it has already been determined at 17.482 MAF for irrigation. Adding 1.52 MAF for domestic and industrial use, the total requirement of Madhya Pradesh comes to (17.482+1.52) 19.002 MAF.

3.3.8 Therefore, the total requirement of both Madhya Pradesh and Gujarat would be as follows:—

Gujarat's total requirement .	14·17 MAF
Madhya Pradesh's total requirement	19·00 MAF
Total water .	33·17 MAF

3.3.9 But the total utilisable flow of water of Narmada river at 75 per cent dependability has been fixed at 27.25 MAF after deducting the shares of Maharashtra and Rajasthan, which is available for apportionment.

3.3.10 After giving my anxious consideration to all the aspects of the matter and to relevant factors and having regard to my findings, the conclusion I come to is that out of 27.25 MAF of Narmada water, Gujarat shall be entitled to an equitable share of 10.00 MAF and Madhya Pradesh shall be entitled to an equitable share of 17.25 MAF. Accordingly allocation is made as under:—

Gujarat	10·00 MAF
Madhya Pradesh . . .	17·25 MAF
Total .	27·25 MAF

This is my answer to Issue No. 7(b).

EQUITABLE APPORTIONMENT OF EXCESS WATERS AND SHARING OF DISTRESS IN LEAN YEARS AMONGST THE PARTY STATES

3.4.1 Issue No. 9 and 9(a) are as under:—

"9. What directions, if any, are required to be given for the equitable apportionment of the waters including excess waters of the Narmada water and of its basin?"

"9(a). What directions, if any, are required to be given regarding the sharing of distress among the concerned States in the event of the waters of the Narmada falling short of the allocated quantum?"

3.4.2 Gujarat's case on this aspect of the matter, *inter alia* is "such surplus supplies would be needed partly to meet the carry over provided in the storage capacities of various projects with a view to meet the plan utilisation of waters."(1) In reply to Maharashtra's submission that surplus flows in excess of 75 per cent dependable flows for consumptive uses and 90 per cent dependable flow for power generation should be distributed in the same proportion and may be determined in apportionment of dependable flows.(2)

3.4.3 On questions regarding sharing of distress in the event of the waters of the Narmada falling short of the allocated quantum in any concerned State in any particular year so that the distress is equitably distributed amongst the concerned States having regard to their relative requirements of water during the fair weather, best of areas being then actually irrigated therein.

3.4.4 Madhya Pradesh has pleaded for allocation of excess flows and sharing of distress in the lean years on the basis of proportion to the water allocated by the Tribunal to the respective States of the total quantum of 28.00 MAF of waters.

3.4.5 Maharashtra has subsequently made a case that the share of 0.5 MAF to the State of Rajasthan should not fluctuate in case of excess or in distress.(3)

3.4.6 State of Rajasthan has claimed allocation of water to the extent of 2,500 cusecs out of the excess flow.

3.4.7 The above claim of Rajasthan was opposed by Madhya Pradesh and Maharashtra, mainly on the ground that Rajasthan is not entitled to get any excess share beyond the allocated quantum of 0.5 MAF of water as provided in the joint agreement, dated 12th July, 1974 (C-1).

3.4.8 Gujarat, however, did not oppose such claim of Rajasthan.

3.4.9 After considering the arguments of the respective party States and the relevant documents and materials on record, I am of the opinion that Rajasthan's additional claim of 2,500 cusecs out of excess waters cannot be allowed. Whatever claim Rajasthan might have of Narmada waters was finally determined by the Joint Agreement between the party States. In other words, Rajasthan got the allocation of 0.5 MAF of water only by virtue of the said agreement, for this Tribunal already held that Rajasthan being a non-riparian State, was not entitled to get any share of water from Narmada. There is nothing in the provisions of the agreement also to support such claim of Rajasthan.

(1) Gujarat Written Submission Vol. 5, page 32.

(2) Statement of Case Vol. 5, page 32, para 4.5.6.

(3) CMP No. 128 of 1977.

3.4.10 Although such is the position, on a fair and proper construction of the agreement, it would be reasonable to hold that both Maharashtra and Rajasthan, should get in the case of excess and sharing in distress in the case of lean years, on the basis and in proportion of their respective allotments, namely, 0.25:28 and 0.5:28 respectively. So the equitable apportionment of excess waters and sharing of distress in the case of Rajasthan and Maharashtra would be in the proportion of 1:56 and 1:112 respectively.

3.4.11 So far as Gujarat and Madhya Pradesh are concerned, I am inclined to take the view that the excess waters of Narmada and the distress in lean years should be shared by both these States in proportion to the apportionment of balance quantum of 27.25 MAF made to them. This means that the equitable apportionment of the excess waters and also sharing of distress would be in the proportion of 10:28 and 17.25:28 respectively.

3.4.12 Accordingly my directions on Issue No. 9 and 9(a) are as follows:—

(1) The utilisable flow of Narmada in excess of the 28 MAF of utilisable flow in any water year *i.e.*, from 1st July to 30th June of next calendar year is apportioned in the following ratio of allocation, *viz.*, 40 for Gujarat, 69 for Madhya Pradesh, 1 for Maharashtra and 2 for Rajasthan.

(2) In the event of available utilisable waters for allocation in any water year from 1st July to 30th June of the next calendar year falling short of 28.00 MAF, the shortage should be shared between the party States in the ratio of 69 by Madhya Pradesh, 40 by Gujarat, 1 by Maharashtra and 2 by Rajasthan.

3.4.13 I agree and pass the same directions as contained in Clauses 3, 4 and 5 of paras 9.8.0 of Chapter IX, Vol. I of the report, so far as rest of the directions are concerned.

3.4.14 The Issue No. 9 and 9(a) are thus disposed of accordingly.

PART IV

FULL SUPPLY LEVEL (FSL) OF NAVAGAM OFFTAKE FROM SARDAR SAROVAR

(Issue No. 6)

4.1.0 Under the Joint Agreement (C—1) of all the party States, by clause 8, it is provided, "that the level of the canal be fixed by the Tribunal after taking into consideration various contentions and submissions of the parties hereto". This relates to Issue No. 6, which is as under:—

> "What should be the height of the dam at Navagam across the Narmada river and what should be the level of the canal at its off-take with adequate discharge carrying capacity from the Navagam Dam."

4.1.1 Gujarat has proposed a high level canal with FSL+300 for irrigation of its command area under Sardar Sarovar Project (G—177).

4.1.2 Gujarat has also proposed that the area which is presently being served by the Mahi Canal ex-Wanakbori weir would be supplied with Narmada waters and the Mahi waters so released would be diverted into the proposed Kadana high level canal offtaking at a level of +380 for irrigating higher lands in Gujarat above the command of +300 canal. This canal would also provide for irrigation in the Jalore and Barmer districts of Rajasthan on full development of Mahi waters.....(1)

4.1.3 Gujarat has also proposed for an artificial fall and lift arrangements for crossing of the natural topographical depressions by the Banni branch and the Saurashtra branch canals.

4.1.4 Madhya Pradesh has objected to the Navagam canal as proposed by Gujarat. It has suggested a canal with FSL 190 at its head, which would be able to fulfil the requirements of Gujarat for irrigation. It is said that FSL +300 canal would involve submergence of considerable area of culturable land of Madhya Pradesh's territory and loss of power potential of Madhya Pradesh....(2)

4.1.5 Maharashtra has proposed the above alternative canal with FSL 190 with a dam of FRL 210 at site No. I, formerly selected by Gujarat for the purpose of its project.

4.1.6 According to Maharashtra, this proposal was made before the Khosla Committee showing, *inter alia*, that the canal alignment with FSL 190 from Navagam Site No. I would be adequate for effective utilisation of water resources of Narmada that may be available to Gujarat for irrigation....(3)

4.1.7 Maharashtra also submitted a detailed study of the Narmada Low Level Canal (4) and also a Note (5) after reverification of the low level canal alignment, before the Khosla Committee. But this Committee did not consider these studies proposed by Maharashtra.

4.1.8 It is said that although Khosla Committee has mentioned that about the memorandum with a proposal of the low level canal with FSL 190, Khosla Committee accepted the FSL +300 canal proposed by Gujarat, on a mis-statement that proposed low level canal would command the major portion of the area only by lift and not by flow. According to Maharashtra, the proposed low level canal would command 66.21 lakh acres by flow and 25.03 lakh acres by lift

Alternative Low Level Canal Scheme with FSL 190

4.1.9 Some time in February, 1976, Maharashtra had submitted an alternative low level canal scheme from the Navagam low dam before this Tribunal (6). The basic scheme in this Report is that of Navagam canal with FSL 190 with a flatter bed gradient of 1 in 20,000 upto off-take of the Banni branch and then 1 in 10,000 upto the offtake of Mudka (Khadol) branch and 1 in 6,000 thereafter to the tail of the main canal. The water requirement for this canal was taken as 17.37 MAF.

4.1.10 In addition to the basic scheme, studies were given for three alternatives, namely, alternative 1—A, alternative 1—B and alternative II.(7) These schemes were proposed with a view to examining the scope of the command of low level canal by flow and by lift irrigation corresponding to different water requirements of Sardar Sarovar Project.

4.1.11 In support of the above low-level canal with bed gradient 1 in 20,000 (called basic scheme),

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(1) Guj. Statement of Case, Vol. I, page 68, para 56·3.

(2) Statement of Case Vol. 10, p. 107.

(3) MR-32—Memorandum of Govt. of Maharashtra on the Development of Narmada.

(4) MR-16.

(5) MR-17.

(6) MR-102

(7) MR-102 Vol. I page 68 onwards.

Maharashtra has relied on several formulae, particularly of Lacey's formula, which is said to give a proper design for unlined channels flowing in their own alluvium and transporting minimum sediment load. Maharashtra has also, proposed, exclusion of certain portion of sediment load by silt excludors and silt ejectors. Maharashtra has asserted that a lined canal designed on the basis of Manning's formula with the same slope (1 in 20,000) has sufficient sediment transport capacity and thus a slope of 1 in 20,000 for a lined canal carrying even less than 30,000 cusecs is considered to be entirely adequate, particularly when it is off-taking directly from a large storage reservoir, which would be silt free.

4.1.12 It is also said, that when a canal offtakes from a reservoir, which acts as a sediment excludor with 100 per cent efficiency, the canal will have to carry only wash load and that since particle sizes of wash load pertaining to clay are sufficiently fine, which according to Maharashtra, is of the order of 0.008 mm, the fall velocities are very small and thus the smallest turbulence would keep such material in suspension and in that condition will be ultimately carried to the field.

4.1.13 Maharashtra has also cited some cases in India regarding the bed slopes and the lined canals. It has also given some instances of the discharge and the bed slopes of some lined canals in support of its design of the low level canal...(1)

4.1.14 In order to establish the techno-economic feasibility of proposed 190 low level canal (the basic scheme) it has given detailed analysis on discussing several formulae to impress the feasibility of such canal, which are briefly as follows:—

(a) As considerable storage would be available also in the low Navagam dam, the water flowing there from and entering the canal would be silt free.

(b) As the slope of the canal adopted by Maharashtra satisfies the requirements of non-silting velocity for unlined canal, the same should be adequate also for a lined canal.

(c) Tractive force available in the proposed design of the lined canal would be adequate to keep the silt in movement and carry it out of the canal to the fields.

(d) That the Lacey's silt factor would be 0.5 for the grade of suspended silt considered.

(e) That the modified critical velocity formula of $VC=0.84\ D^{0.5}$ as applicable to clear water would be applicable to the proposed Navagam canal.

(f) The weighted mean diameter of the silt entering the canal is calculated and fixed at 0.075 mm....(2)

4.1.15 Maharashtra's further case is that it would be possible for Gujarat to irrigate its proposed areas from the command of 190 canal with the quantum of water that may be allocated under equitable apportionment by flow irrigation without taking recourse to lift irrigation. But in case of irrigation of some higher areas between the command of 190 canal and 300 canal, that would be required to be done by lift irrigation, and in that case, the cost of such lift irrigation cannot be considered as a charge on this low level canal scheme.

4.1.16 After the proposal of the above low level canal was submitted by Maharashtra before this Tribunal, Rajasthan, who in the meantime became entitled by virtue of Joint Agreement between all party States, to a share of 0.5 MAF of water from Narmada river, also put in before this Tribunal its Project Report (3) for utilisation of the above quantity of water 0.5 MAF in its territory, with a proposal of the same high level canal (FSL+300) with a modification, namely, that it proposes a bed gradient of 1 in 12,000 from head to the boundary of Rajasthan where the water level would be RL 141. This is necessary, according to Rajasthan, for irrigation of the areas covered by its project by flow.

Objections of Gujarat

4.1.17 Gujarat opposed the above proposal of Maharashtra on various grounds. (4). The broad contention of Gujarat is that such a proposal is techno-economically improper, inadequate and insufficient. Brief particulars of these objections are as under:—

(a) The alignment of the proposed low level canal is only a paper study without any detailed investigation.

(b) The lined canals are not designed on the basis of non-silting velocity but on the maximum permissible velocity.

(c) On Maharashtra's own showing, the proposed canal alignment passes flood zones of several en-route rivers and this involves serious risks resulting in disastrous affects on the entire irrigation system.

(d) Some of the best irrigable areas lying in the strip between the 190 and 300 canals will have to be irrigated, if at all permanently, by lift irrigation system.

(e) The alignment in the head reach of the canal as proposed along the river bank would not be safe.

(f) The larger cross-section of the canal necessary on account of flatter bed slope in the proposed canal would be more expensive for excavation, lining and structures on the canal.

(g) The canal alignment at Ahmedabad would pass through congested areas and

(1) MR-102, Chapter II.

(2) MR-102, Vol. I, Chapters I, II & III.

(3) R-267, with CMP No. 59 of 1976,

(4) Ex G-835.

that would involve further cost to make the embankment of the canal higher, whereas the alignment of 300 canal passes by the outskirts of Ahmedabad city.

(h) In the case of the design of the lined irrigation canals, the size of the active bed material has to be considered instead of observed suspended sediment.

(i) The Dam at Navagam with 210 FRL and the proposed low level canal would get silted in about 50 years.

(j) Maharashtra's suggestion that 0.5 MAF water allocated to Rajasthan under the Agreement (C—1), can be exchanged with Gujarat for an equivalent supply from Mahi Kadana system is unacceptable and cannot be given effect to by this Tribunal.

Objections of Rajasthan(1)

4.1.18 Rajasthan has also raised various objections(2) and in substance supported Gujarat. The principal objection of Rajasthan is that by the proposed low level canal, Rajasthan would be forced to adopt lift irrigation for whole of its area for utilisation of 0.5 MAF of water from river Narmada.

4.1.19 There are also other differences between States over the extent of areas proposed to be included in the command of the Navagam canal, CCA for irrigation, cropping pattern, intensity of irrigation, annual water requirements for the crops, monthly requirements of Navagam canal, availability of waters from en-route rivers etc.

4.1.20 It may be mentioned that Madhya Pradesh also has proposed a low dam with FRL 210 at site No. 1, with the above 190 low level canal as designed by Maharashtra and adopted the arguments of Maharashtra in support of the low level canal. Madhya Pradesh also has produced a further study(3) in support of the proposed 190 canal.

4.1.21 After considering the arguments of all the concerned party States, and relevant documents and material on record, I agree with the line of reasoning and the conclusions arrived at in Volume II, Chapter X, paragraphs 10.10.0 to 10.15.1.

4.1.22 It should, however, be mentioned here that some aspects of the matter were considered on the basis of assumed allocation of 9.00 MAF of water to Gujarat. I, therefore, make it clear that if those very questions are considered on the assumption of 10.00 MAF of water in favour of Gujarat, the results or conclusions thereof, will not be different. On the contrary, on the question of feasibility of lift irrigation, the cost that may be incurred will be higher.

4.1.23 Accordingly it is determined that fully supply level of Navagam canal be fixed at +300 off taking at Sardar Sarovar.

4.1.24 I should make it clear that bed gradients of 1 in 12,000 may be changed by Gujarat and Rajasthan by mutual agreement.

4.1.25 It should be mentioned in this connection that on the assumption that I MAF of water if distributed in proportion to the water requirements as claimed by Gujarat i.e. 2.47 MAF in respect of Little Rann and Banni Areas, then it appears that for serving Banni area, the extra cost would be Rs. 2.34 crores per year on account of lift irrigation as shown in Annexure-I attached herewith.

4.1.26 It is, however, to be noted that as far as Little Rann is concerned this can be served by gravity flow from the 190 canal as proposed by Maharashtra.

ANNEXURE I

Extra Cost of Lift Irrigation for Banni and Little Rann Areas with Allotment of Water of 1 MAF from 190 Canal

	Area in lakh acres		Water requirements in MAF as indicated in G-177 (Vol. III, p. 353)
Little Rann	2·0		1·15
Banni	2·28		1·32
		Total	2·47

Assuming that only 1 MAF would be available for these areas, the proportionate allotment out of 1 MAF works out as follows:—

For Little Rann—

$$\frac{1\cdot15}{2\cdot47}=0\cdot47 \text{ MAF}$$

For Banni—

$$\frac{1\cdot32}{2\cdot47}=0\cdot53 \text{ MAF}$$

1. *Little Rann*:

It is seen from Statement A-IV, page 117 of MR-102, that Little Rann is likely to be fed by flow from +190 canal. Hence, no lift irrigation is required for that area.

2. *Banni*:

2.1 The lift involved for irrigation of Banni area is calculated as follows:—

Full supply canal level at offtake of Banni branch with +190 canal having a slope of 1 in 12,000 upto Saurashtra branch, and 1 in 10,000 thereafter.

=56.93 ft. (i)

(1) Ex. R-267.

(2) ibid.

(3) Ex. MP-1173.

2.2 According to Gujarat's proposal, the level at offtake of Banni branch is 140.54, there is a drop of 47 feet and then a lift of 45 feet after crossing the depression (vide statement 15.1.2—Volume VII, G-177). Thus, the FS level of Banni branch after crossing the depression works out to (140.54 minus 47+45), i.e. 138.54 feet (ii). Therefore, the lift involved for pumping water into Banni Branch from 190 canal works out to 138.54—56.93=81.61 feet =24.88 metres.

2.3 According to the Report of Rajasthan Canal Project (Stage-II), prepared by WAPCOS—the annual cost of energy for lifting water for one hectare (water quantity of 0.51 hectare metres), vide R—290, Volume-I, Annexure 3.1(4), would be:—

For a lift of 20 metres	=	Rs. 86·2
For a lift of 30 metres	=	Rs. 129·3
Therefore for a lift of 24·88 metres.	=	Rs. 107·23 (For 0·51 hectare metres, i.e. 4·14 acre feet).

Therefore, cost of energy for lifting 0.53 MAF for Banni area= $\frac{107 \cdot 23}{4 \cdot 14} \times 0.53 \times 10^6$=Rs. 1.37 crores.

2.4 In addition to cost of energy, there will be cost of depreciation of pumping and electrical equipment plus maintenance of same, per year. This has been taken as Rs. 105 per hectare, vide Annexure 3.1 of Rajasthan Canal Project (Stage-II) Report prepared by WAPCOS. This works out to Rs. 42.5 per acre.

For 2.28 lakh acres, the annual cost would be—

$=2.28 \times 10^5 \times 42.5$ rupees.

=Rs. 0.97 crores.

2.5 Thus, the total annual cost for converting 2.28 lakh acres from flow to lift irrigation will be the cost of energy plus cost of depreciation of pumping and electrical equipment, and maintenance, per year, which works out to Rs. 1.37 crores+0.97 crores, i.e., Rs. 2.34 crores.

3. As such, the additional cost for utilising 1 MAF of water for Banni and Rann areas would be Rs. 2.34 crores.

HEIGHT OF THE NAVAGAM DAM

Issue No. 6

4.2.1 What should be the height of the dam at Navagam across the Narmada river and what should be the level of the canal at its off-take with adequate discharge carrying capacity from the Navagam dam?

Navagam Project

4.2.2 Navagam dam is supposed to be the terminal Dam on the river Narmada with a multipurpose project, viz., for irrigation, domestic and industrial uses, power generation, flood moderation, etc. According to Gujarat its height is required to be determined in the context of equitable utilisation of the waters of the inter-State river. The height of the Navagam Dam must be such as would afford adequate live storage for consumptive and non-consumptive uses and capacity for flood moderation(1).

It is stated:

> "a dam built across a river creates a reservoir behind it and part of the run-off from the catchment upstream of the Dam is stored in the reservoir. Storage is done when flow is in excess of the demand. Demand of water for various purposes like irrigation, power or water supply is supplied from the run-off the river when flow is in excess of the demand and from the reservoir storage during lean periods.
>
> Reservoir storage is generally made of three parts.
>
> (a) Dead Storage
>
> (b) Live storage, and
>
> (c) Flood storage
>
> each of these is provided to serve a basic purpose. Provision of dead storage is made for sediment deposition during the impoundment of the sediment laden waters and also for the minimum draw down in case of power projects. Live storage assures the supply of water for a specified period to meet the actual demand of the project whether it is for irrigation, power or water supply. Flood control storage takes care of high floods and moderates them so that the safety of the hydraulic structures and the life and properties down below are not endangered.(2)"

4.2.3 The determination of the height of the Navagam Dam according to Gujarat requires consideration of several factors viz., (i) availability of appropriate geological site conditions for foundation, (ii) dead storage, (iii) full supply level (FSL) of the canal at the offtake and low water level (LWL) required to provide cut off to pass design discharge in the canal, (iv) live storage required for meeting consumptive uses, (v) height required to meet the consumptive uses and for power generation, (vi) flood storage and (vii) submergence of properties and power sites upstream.(3)

4.2.4 It is already decided by this Tribunal that submergence within the boundary of another State is permissible by raising FRL of a proposed Dam to meet the consumptive uses in the state and that (b) the consequential submergence of properties in a State under a project of another State cannot per se be regarded as an injury, but submergence has to be viewed in the context of the affectation of the capacity of the upstream state to utilise the waters of the inter-State river.

4.2.5 Under the agreement (Ex C-1 dt. 12th July, 74) between the party States the concerned States

(1) Written Submission of Gujarat No. 7 p. 1

(2) G-746 Part I, Gen. Requirements, IS : 5477 (Part-I)-1969 pp. 2-3 paras 0·2 and 0·3

(3) GWS No. 7 pp. 2-3.

have agreed that the entire available 28 MAF of utilisable quantum of Narmada waters at Navagam Dam should be allocated among the States for consumptive uses which is really irrigation use.

4.2.6 Gujarat's proposed irrigation under Navagam conflicts with proposed uses of power generation at Jalsindhi, Harinphal and Maheshwar proposed by the upstream States of Maharashtra and Madhya Pradesh. Gujarat's case is that for its social and economic need irrigation is entitled to priority over power generation at the above three proposed projects.(1)

Geology of The Navagam Dam Site (Re-oriented Site No. 3)

4.2.7 The case of Gujarat on this aspect as appears from pleadings substantially is that a site near Gora was first proposed by the CWPC for construction of a weir with FRL 160 in the first stage with a gross command area of 13.3 lakh acres through a right bank canal in 1956 under the then State of Bombay.(2) But after further investigation the site was shifted at a place known as Navagam one and a half miles upstream of Gora site (Site No. 2) on the recommendation of CWPC and accordingly the project was modified restricting the FRL to 163 at the first stage and 300 in second stage and came to be known as Broach Irrigation Project.(3)

4.2.8 Thereafter, in 1960, on the report of a panel of consultants Committee these two stages of the proposed project were combined into one and the Dam was proposed to be constructed in one stage with FRL 320 with further recommendation for extending irrigation towards the Rann of Kutch. Then after the separation of the territories of states of Bombay and Gujarat under the Bombay Reorganisation Act of 1960 the Broach Irrigation Project (stage one), however, was accepted by the Planning Commission in 1960, which was approved by the Government of Gujarat in February, 1961. But after the command area surveys and the reservoir submergence area surveys this project indicated that much larger area could be commanded under a high level (+300) canal and accordingly the Navagam Dam site was shifted to a site about three and a half miles upstream called site number 3 which was found suitable for construction of high Dam. Some time in November, 1963, an agreement was reached between Madhya Pradesh State and Gujarat State whereby Madhya Pradesh State agreed among other things for raising the FRL of proposed Navagam Dam to 425 but this agreement was not subsequently ratified and given effect to by the State of Madhya Pradesh. Thereafter, a Committee named as 'Narmada Water Resources Development Committee' referred to as the 'Khosla Committee' was constituted by the Central Government which in its report recommended the construction of the Navagam Dam at Site No. 3 with FRL 500. It is said that the 'Lower most Rocky reach' affords an excellent Dam site at Navagam from where the river debouches into the planes of Gujarat. The Dam site is suitable from the geological point of view.(4)

4.2.9 It is said that Site No. 3 was selected but later on there was a little change in the above site by shifting about half a mile which is now termed as "re-oriented site No. 3". Gujarat has now pressed its case before this Tribunal for building the proposed Dam with FRL 530 with additional height of 10 ft. for flood protection i.e., in all with MWL 540 at this re-oriented site No. 3.

4.2.10 Gujarat's further case is that although there is existence of faults at the re-oriented Dam site No. 3 that fact by itself will not render the site as unsuitable for construction of Dam. Appropriate treatments are usually adopted for structural equilibrium of the foundation by (i) Grouting, (ii) plugging and (iii) Excavation down to the foot wall of the fault zone etc.(5) as recommended by various technological authorities and experts(6) and recommended by number of geologists belonging to the Geological Survey of India, who made successive investigations into the feasibility of the construction at the above site extending over a number of years from 1964 to 1969.(7)

4.2.11 Still further case of Gujarat is that even if the Navagam Dam Site No. 3 lies in seismogenic zone the construction of high Dam in such zone is a matter of common occurrence and many dams have been constructed in such zones both in India and abroad. The only protection that need be given in such cases is to adopt proper earthquake resistant design of structures according to the criteria laid down under the Indian Standards for construction of Dams(8) in seismic zone. Gujarat has obtained from the Standing Committee appointed by the Government of India a designed seismic co-efficient of 0.1. g.(9). Thus according to Gujarat even on seismological consideration construction of high Dam at the above site No. 3 would not constitute any hazard(10). Gujarat in support of its case has relied on a number of successive geological investigation report including those by some experts in geology engineering belonging to Geological Survey of India covering a period between 1963 and 1969.(11)

(1) Gujarats WS No. 7, pp. 47 to 52.

(2) G-176 Vol I prepared by CWPC.

(3) G-183, Brief report on Narmada Project with FRL 425.

(4) Statement of case of Gujarat Vol. I pp. 38 to 43, 47 to 49 & 62. Ex G-177, Vol. II pp. 116-117 and 117-118.

(5) G-177 Vol. V pp. 81-83 Para 14.

(6) G-627 & WS of Guj. No. 7 pp. 4 to 7.

(7) G-177, Vol. VA, VB, VC, SS Project.

(8) G-633.

(9) Ex G-177, Vol. V, p. 111, para 222·1, G-622 pp. 89, 93, G-634.

(10) G-WS No. 7 pp. 7 to 11.

(11) G-177, V, VA pp. 1 to 89, 90—218, VB pp. 1 to 103, VC 1 to 213 & 42-65, G-984 Geology of Navagam dam site Narmada project Gujarat State alongwith 5 plates.

4.2.12 Madhya Pradesh State denied the suitability of the re-oriented site No. 3 for construction of Navagam Dam with FRL 530 both on geological and seismological grounds. It is said that "not only the river is much wider at this site than at other upstream sites in the gorge, but also has unfavourable geological features. There has recently been a serious earthquake at the site and a high Dam here must be regarded as a serious risk". It is also said that such a Dam site is not ideal from the point of view of easy commandability of a vast area as claimed by Gujarat in as much as the alignment of the proposed 300 canal from this Dam has most unfavourable features and the command area can be approached only by crossing several large rivers.(1)

4.2.13 Madhya Pradesh State has produced its own studies regarding several aspects *viz* (a) Regional Geology, (b) History of Geological investigation for suitability of the Dam site No. 3, (c) Geomorphic analysis of the physical features at the Dam site, (d) local geology, (e) Structural features of the said site and (f) Seismicity of the site and its surroundings. Broad contention of contention of Madhya Pradesh State is that geological investigations and report of successive years from 1963-64 to 1968-69 would show serious infirmities of the proposed site. At any rate such investigations or the various studies carried out were not proper and sufficient to establish the feasibility of construction of such a high Dam at the proposed site. On the contrary, analytical studies carried out by Madhya Pradesh on various scientific and technical aspects relating to the proposed site would establish that this re-oriented site No. 3 is totally unsuitable, unsound and insecure for the construction of the proposed Dam both on geological and seismological grounds and Gujarat should not be permitted to proceed with the proposed construction of such a high Dam at the selected site.

4.2.14 Gujarat has produced two other documents, the first one(2) in reply to the arguments of Madhya Pradesh and its study report and the second(3) one —a comment of the study report of Madhya Pradesh dealing with seismological aspect of the proposed site. In short, the above two reports have sought to support Gujarat's case for construction of a high Navagam Dam at re-oriented site No. 3 both on geological and seismological aspects.

4.2.15 State of Maharashtra has very strongly disputed the feasibility of construction of proposed high Navagam Dam at re-oriented site No. 3 both on geological and seismological grounds. Both Madhya Pradesh and Maharashtra have also disputed the correctness or validity of the above two studies produced by Gujarat.

4.2.16 Considering the arguments of all the party States concerned and documents and materials on record, I am unable to accept the contentions of both Madhya Pradesh State and Maharashtra as correct. In the facts and circumstances revealed, it seems clear that the geological defects, if there be any, can be corrected on proper treatment. It is, however, contended that such proper treatment can be carried out only at inordinately high cost which would be far higher than the cost estimate made by Gujarat(4). This again is a disputed question and can hardly be resolved at this stage. In any case, the State of Gujarat in its own interest would be required to incur such cost as may be necessary for making the construction of the proposed Dam safe and secure.

4.2.17 As regards the infirmities of the proposed site due to seismic activities, it appears that Gujarat obtained from the Standing Committee appointed by Government of India, as already noticed, a design seismic co-efficient of 0.1.g. It is also clear that Standing Committee considered all relevant factors while determining this design seismic co-efficient of 0.1.g, for the proposed construction of Navagam Dam. There are, again, number of instances in India where dams have been constructed with proper safeguards within seismic zones. In these circumstances, I do not think that even on seismological consideration construction of a high Dam at the above Site No. 3 would constitute any hazard. Therefore, I am inclined to take the view that re-oriented Site No. 3 cannot be said to be unsuitable for construction of a high Dam as proposed by Gujarat.

Determination of the Height of Navagam Dam

4.2.18 Clause VII of the joint agreement(5) between all the party States provides "that the height of the Navagam Dam be fixed by the Tribunal after taking into consideration various contentions and submissions of the parties hereto". Over this question, issue No. 6 is modified as under:—

> "What should be the height of the Dam at Navagam across the Narmada and what should be the level of the canal at its offtake with adequate discharge carrying capacity from the Navagam Dam?"

It is clear that first part of the issue refers to the determination of the height of the Dam at Navagam across the Narmada river.

4.2.19 Issue No. 13(b) which is connected with modified Issue No. 6 is as under:—

> "Should any direction be given for specification of FRL and MWL of the storage at Navagam Dam and the FSL of the Navagam canal so as not to prejudicially affect the interest of Madhya Pradesh, Maharashtra, Gujarat and other concerned state?"

In order to determine the height of the Dam and to give necessary directions as contemplated in Issue No.

(1) MP Rejoinder Vol. X, pp. 123-124 Para 9·54.
(2) G-1061—Comments of Shri Srivastava, Director GSI.
(3) G-1073.
(4) MR Note No. 31, p. 5.
(5) C-1.

13(b), both the issue should be taken up together for consideration.

4.2.20 Gujarat's case *inter alia* is that quantum of flow in the Narmada river that could be beneficially harnessed is the maximum at the terminal dam site at Navagam enabling the fullest scope for its exploitation for multipurpose benefits. Further, these flows have the highest reliability in terms of variations from year to year owing to the larger catchment at the terminal dam site. Navagam Dam thus afford maximum regulation with economical storage. For optimum development of Narmada waters, a storage as large as possible at the terminal dam site would be essential. (1)

4.2.21 According to Gujarat the height of the Navagam Dam is required to be determined in the context of equitable utilisation of the waters of inter-State river. The height of the Navagam Dam must be such as would afford adequate live storage for consumptive and non-consumptive uses and capacity for flood moderation.

4.2.22 It is said that the determination of the height of the Navagam Dam requires consideration of several factors, as already stated in paragraph 4.2.3.

4.2.23 Gujarat has proposed before this Tribunal construction of Navagam with FRL 530 with additional 10 feet height for flood protection i.e. in all with MWL 540.

4.2.24 I have already determined in Part III of this Volume allocation of 10 MAF of Narmada water in favour of Gujarat and 17.25 MAF has been allocated in favour of Madhya Pradesh out of the utilisable quantum of 27.25 MAF of Narmada waters to be distributed between these two States. In Part IV of this volume, I have considered the question of determination of full supply level of Navagam canal and adopting the line of reasoning given in Chapter X of Volume II of the report, I have determined that the full supply level of the Navagam canal should be +300 FSL. On the basis of these findings, question regarding fixation of the height of the Dam at Navagam should be examined.

4.2.25 It appears that the above question has been examined in Chapter XI, Volume-II on the basis of allocation of 9 MAF waters to Gujarat and 18.25 MAF to Madhya Pradesh and of determination of the full supply level of Navagam Canal at+300 RSL.

4.2.26 It appears that for allocation of 9 MAF to Gujarat, the gross storage capacity of Sardar Sarovar works out to 7.44 MAF as under:

	MAF
Dead Storage MDDL+362	2·94
Space for silt deposition in live storage	0·30
Capacity required for regulation and carry over	4·20
	7·44

This corresponds to FRL +453.

4.2.27 But the FRL of Sardar Sarovar has been fixed at +455. At this level the gross capacity of the reservoir would come to 7.7 MAF. This FRL of 455 has been fixed considering among other things storage of some additional water (0.20 MAF) from surplus years which may be utilised by the party states in proportion to their apportioned shares.

4.2.28 Adopting the line of reasoning given in paragraph 11.3.1 to 11.15.3 of Chapter 11 of Vol. II of the Report, it would appear that with higher apportionment to Gujarat, a higher FRL would obtain with higher MDDL a somewhat larger space requirement for dead storage and then consequently higher capacity necessary for regulation and carry over. Allowing for these requirements the FRL for 10 MAF allocation of Gujarat would come to as under:—

Allocation to Gujarat	10 MAF
FRL of Sardar Sarovar	458

4.2.29 The MWL is governed primarily by the spillway capacity. In Sardar Sarovar project report Gujarat has provided 26 radial gates of 46 feet height. This gives a flood lift of 10 feet, i.e., the MWL is kept 10 feet higher than FRL. In order to avoid submergence of unduly large area a flood lift of 5 feet would be appropriate and for achieving this 28 larger radial gates of 55 feet height should be provided. This would give more or less the optimum spillway capacity. Therefore, a flood lift of 5 feet will need to be provided with allocation of 10 MAF Narmada waters to Gujarat.

4.2.30 I agree and adopt the line of reasoning given in paragraph 11.16.3 to 11.16.12 of Chapter XI Vol. II of the Report and determine that MWL not exceeding 463 should be adopted for Sardar Sarovar reservoir.

4.2.31 Accordingly, in view of allocation of 10 MAF of water to Gujarat the height of the Navagam dam would be fixed at Full Reservoir Level 458 and the Maximum Water Level at 463. Issue No. 6 and Issue No. 13(b) are disposed of accordingly.

Height of Navagam Canal—Alternative proposal of Madhya Pradesh & Maharashtra

4.2.32 Gujarat has proposed to build Sardar Sarovar Dam with full reservoir level (FRL+530) and maximum water level (MWL+540) at reoriented Site No. 3 with Navagam Canal taking off with full supply level (FSL+300).

4.2.33 Madhya Pradesh and Maharashtra have proposed that Sardar Sarovar Dam should be restricted to FSL+210 with Navagam Canal taking off with FSL+190.

4.2.34 It has already been determined that on the basis of allocation of 10 MAF of Narmada waters, the FRL at Sardar Sarovar has been fixed at+458 and MWL at 463. It has also been determined that the Navagam Canal is required to take off with FSL+300.

4.2.35 This question has been fully discussed and considered on relative merits of Sardar Sarovar of

(1) Gujarat's Statement of case Vol. I pp. 94-95.

FRL+455 with that of the proposal of Madhya Pradesh and Maharashtra for Jalsindhi Dam, FRL+420 and Sardar Sarovar Dam FRL+210 in paragraphs 13.2.1 to 13.6.4 of Chapter XIII of Volume II of the report and for the reasons given therein, the alternative proposal of Sardar Sarovar Dam with FRL+210 has not been accepted.

4.2.36 On the basis of allocation of 10 MAF of water, it is clear that the height of the Sardar Sarovar Dam as already noticed would come to+458. Adopting the same line of reasoning—my conclusion is that the alternative proposal of Sardar Sarovar Dam+210 cannot be accepted.

PART V

DISTRIBUTION OF COSTS AND BENEFITS

5.1.1 This matter arises for consideration under modified Issue 17, which reads as under:—

> "Whether the costs and benefits of the Navagam Project of Gujarat are required to be shared amongst the concerned States. If so, in what manner and on what terms and conditions? If not, whether Gujarat is liable to pay any, and if so, what compensation to Maharashtra and/or Madhya Pradesh for loss of power? Whether Maharashtra and/or Madhya Pradesh are entitled to any share of power because of their proposed projects, namely, Jalsindhi, Harinphal and Maheshwar."

5.1.2 This issue has been considered and decided in Chapter XIV of Volume II of the Report on the assumption that the height of the Navagam Dam would be fixed at FRL 455 and MWL 460 and that Gujarat would be permitted to build the proposed Navagam Dam upto that height.

5.1.3 The question centres round the submergence of Jalsindhi project which has since been revised in 1977, combining Harinphal and Jalsindhi into one Project with FRL 420 and TWL 210 and provides for an annual flow of about 4.5 MAF (at 75 per cent reliability). It appears that the estimated power development is 309 MW (at 100 per cent load factor) at commencement and 59 MW (at 100 per cent load factor) when irrigation would be fully developed. In the Project Report it is stated that the power available will depend upon the quantum of water allocated by the Tribunal to Gujarat and gives an indication of the extent of such power for 8 and 10 MAF allocation to Gujarat.

5.1.4 Maharashtra has claimed finally full restitution for losses of this power site and not merely compensation for more potentiality of the site. In other words, it is stated that the party injured must be placed in the same position as if there was no injury at all.

5.1.5 I agree with the reasons and conclusions given in Chapter XIV of Volume II of the Report for distribution of the net power produced in Sardar Sarovar at canal head and river bed power houses between Madhya Pradesh, Maharashtra and Gujarat.

5.1.6 In paragraph No. 14.6.2 of the Report, it has been stated as under:—

> "Thus out of the net power produced in Sardar Sarovar at canal head and river bed power houses on any day, share of Madhya Pradesh will be 57 per cent, Maharashtra's share will be 27 per cent, Gujarat's share will be 16 per cent,".

5.1.7 The above conclusions has been made on the basis of 9.00 MAF of water allocation to Gujarat and 18.25 MAF to Madhya Pradesh. On this basis, the height of the Navagam Dam has been determined at 455 FRL and the MWL has been fixed at 460.

5.1.8 In view of the allocation of 10.00 MAF of Narmada water to Gujarat and 17.25 MAF of water to Madhya Pradesh, as determined by me, the FRL of the Navagam Dam would come to 458, as a consequence thereof, as already determined. On this basis, the proportions of the respective party States would be as under:—

Madhya Pradesh . . .	57·5%	of power produced at Sardar, Sarovar.
Maharashtra . . .	27·7%	
Gujarat	14·8%	

5.1.9 It may be mentioned, in this connection, that the loss of power at Maheshwar, has not been taken into account in the above proportions determined by me as the reduction consequent on rise in FRL is marginal. The calculation of this marginal loss even in a surplus year is shown in Annexure I, annexed hereto.

5.1.10 The above Issue No. 17 is, thus, disposed of accordingly.

ANNEXURE I

Percentage Loss in Energy Generation at Maheshwar with Sardar Sarovar FRL+458

In a surplus year, Sardar Sarovar Level goes beyond+458′ for about 7 days (2 days in October and 5 days in November).

The salient levels at Maheshwar are:—

Full Reservoir Level . . .	+534	feet
Dead storage Level . . .	+532	feet
Average TWL . . .	+457	feet

Effective head $= \frac{2}{3}(534 - 532) + 532 - 457$

$= 76 \cdot 3$ feet

Net releases from Maheshwar for an allocation of

10MAF to Gujarat = 11·776 MAF

Draft in September and October

$= 2 \cdot 163 + 2 \cdot 163 = 4\ 326$ MAF

Draft in November

$= 0 \cdot 745$ MAF or $1 \cdot 490$ MAF at 50% L.F.

Assuming Power Draft is restricted to 1·49 MAF/month in September and October, total Power Draft in a year

$$= 11 \cdot 776 - (4 \cdot 326 - 2 \times 1 \cdot 49)$$
$$= 10 \cdot 430 \text{ MAF}$$

∴Power generated at Maheshwar (av. TWL 457′) for a draft of 10·430 MAF per year

$$= \frac{10 \cdot 43 \times 1381 \times 76 \cdot 3}{14 \times 1000}$$
$$= 78 \cdot 5 \text{ MW} = 687 \cdot 66 \text{ MU}$$

For about 7 days in a year (i.e. 30th Oct. to 5th Nov.) Av. TWL rises above 457′

Releases from Maheshwar in October
$$= 2 \cdot 163 \text{ MAF}$$

Releases from Maheshwar in October/day
$$= \frac{2 \cdot 163}{31}$$
$$= 69774 \text{ Acre feet} = 35239 \text{ cusecs.}$$

(This discharge would be however restricted to 25084 cusecs, due to machine capacity limitations).

Releases from Maheshwar in November
$$= 0 \cdot 745 \text{ MAF}$$

Releases from Maheshwar in November/day
$$= \frac{0 \cdot 745}{30}$$
$$= 24833 \text{ ac. feet}$$
$$= 12542 \text{ cusecs.}$$

Loss of head due to raising TWL from +457′ to 458′ = 1′

Loss in Power Generation at Maheshwar for 2 days of October
$$= \frac{25084 \times 1}{14 \times 1000} = 1 \cdot 79 \text{ MW}$$
$$= 1 \cdot 79 \times 1000 \times 2 \times 24 \times 10^{-6} = 0 \cdot 09 \text{MU}$$

Loss in Power Generation at Maheshwar for 5 days of November
$$= \frac{12542 \times 1}{14 \times 1000} = 0 \cdot 896 \text{ MW Say} = 0 \cdot 9 \text{ MW}$$
$$= 0 \cdot 9 \times 1000 \times 5 \times 24 \times 10^{-6} = 0 \cdot 11 \text{ MW}$$

∴Total loss of Energy for 7 days period when TWL is above 457′
$$= 0 \cdot 09 + \cdot 11 = 0 \cdot 2 \text{ MU}$$

Therefore percentage loss of energy in a period of one year
$$= \frac{0 \cdot 2}{687 \cdot 66} \times 100$$
$$= 0 \cdot 03 \%.$$

DIRECTIONS TO MADHYA PRADEH, GUJARAT AND MAHARASHTRA REGARDING SUBMERGENCE, LAND ACQUISITION AND REHABILITATION OF DISPLACED PERSONS

Submergence

5.2.1 On the question of Submergence, I should make it clear that in view of the allocation of 10.00 MAF of water to Gujarat as determined by me, and the consequential changes in the height of the Navagam Dam to FRL 458, there would be additional submergence of about 4985 acres in gross area and 1848 acres of land in cultivable area of Madhya Pradesh as shown in the following comparative statement:—

Level	Gross Area (Acres)	Cultivable Area (Acres)
458	96,485	31,848
455	91,500	30,000
Difference	4,985	1,848

5.2.2 I agree with the rest of the reasons and conclusions and directions given in Chapter XVI, Vol. II of the Report so far as they relate to submergence, land acquisition and rehabilitation of displaced persons.

5.2.3 I should also make it clear that the directions given for acquisition, rehabilitation and all other matters, as stated above, will extend also to additional submergence, acquisition and rehabilitation of displaced persons.

DIRECTION REGARDING SETTING UP OF THE MACHINERY FOR IMPLEMENTING THE DECISION OF THE TRIBUNAL

5.3.1 This is covered by Issue 14, which is as under:—

> "What machinery, if any, should be set up to make available and regulate allocation of waters to the States concerned, or otherwise to implement the decision of the Tribunal?"

5.3.2 I agree with the reasons, conclusions and directions given for setting up of machinery for giving effect to the final order of the Tribunal as contained in Chapter XVIII of Volume II of the Report (Paragraphs 18.1.0 to 18.5.10) and the provisions of Part-A, thereto.

5.3.3 As regards Part-B, in view of the allocation of 10 MAF of Narmada waters to Gujarat and 17.25 MAF to Madhya Pradesh, the directions in clauses (1) and (2) of Part-B, shall stand modified as follows:—

> "The 28 MAF utilisable supplies of 75 per cent dependability in a water year (1st July to 30th June next year), shall be shared by the party States as under:—

Madhya Pradesh	17·25	MAF
Gujarat	10·00	MAF
Rajasthan	0·50	MAF
Maharashtra	0·25	MAF
Total	28·00	MAF

Clause (II): Surplus or deficit utilisable supplies in a water year shall be shared to the extent feasible by the Party States in the same

proportion as their allotted shares in Clause I above."

5.3.4 Save as aforesaid, I agree with all the provisions contained in Part-B of the directions in Volume II, Chapter XVIII of the Report.

DOWN STREAM BENEFITS—QUESTION OF PAYMENT BY GUJARAT TO MADHYA PRADESH

5.4.1 These questions are covered by Issues 13 and 18 which are as under:—

"13. Should any directions be given

(a) for releases of adequate water by Madhya Pradesh below Narmadasagar for the setting up and operation of Navagam Dam;

(b) for specification of FRL and MWL of the storage at Navagam Dam and the FSL of Navagam canal so as not to prejudicially affect the interests of Madhya Pradesh, Maharashtra or the other concerned States;

(c) for releases by the State of Madhya Pradesh below Narmadasagar for the benefits of the States of Gujarat and Maharashtra;

(d) for the releases by the State of Madhya Pradesh below Narmadasagar for the benefits of the State of Rajasthan.

18. Whether the Navagam project is liable to pay any compensation to any upstream project or projects in consideration of receiving regulated releases of the Narmada waters therefrom? If so, how much and on what terms and conditions?"

5.4.2 These issues have been considered under Chapter XV of Volume II of the Report on the basis of allocation of 9.00 MAF to Gujarat and 0.5 MAF to Rajasthan at Sardar Sarovar out of 28.00 MAF. At the requirements of Sardar Sarovar have to be met by releases from Narmadasagar and by inflows from the intermediate catchment, which would be surplus to the requirements of Madhya Pradesh below Narmadasagar and Maharashtra, the releases from Maheshwar on the basis of above allocation of 9.00 MAF to Gujarat and 0.5 MAF to Rajasthan, has been determined at 8.12 MAF. But on the basis of allocation of 10 MAF to Gujarat, Madhya Pradesh will be required to make a regulated release of 8.936 MAF annually. This gives a uniform monthly regulated release of 0.745 MAF. Annexure I attached hereto will show the computation.

5.4.3 Gujarat has denied its liability to make payment for regulated releases to Madhya Pradesh from its upstream projects. Gujarat has further contended that as a matter of principle, Madhya Pradesh is not entitled to get any payment on account of such regulated releases. Gujarat has dealt with this aspect of the question and has submitted, *inter alia,*

> "Gujarat submits that the contents of the project reports for the Punasa and Jalsindhi projects indicating the quantum of regulated releases in the initial and final stages below the two projects do not indicate or corroborate any principle. Gujarat submits that the said statements are merely factual assertions by Madhya Pradesh and/or Maharashtra. Gujarat submits that the mention of the amounts of regulated releases from the upstream projects likely to be received at Navagam in different stages of development of irrigation mentioned in the Navagam Project Report are similarly anticipation of facts and not recognition of any principle. Gujarat submits that in formulating Navagam Project which would operate in post-Punasa conditions, Gujarat could not shut its eyes to the facts that would exist after the construction of Punasa and the change in the Narmada river below Punasa. Gujarat submits that realization of future events cannot be regarded as a recognition by Gujarat of any principle propounded by Madhya Pradesh..."(1)

5.4.4 Madhya Pradesh has contended, relying on several compacts, agreements and international treaties that these resources furnish legal basis of such liability....(2)

5.4.5 Madhya Pradesh has also contended that question of principle for the payment of regulated releases finds acceptance in our country also and in aid of such contention, it has relied on 6th, 7th and 8th Seminars of Irrigation & Power and Reports of (i) Chopra Committee, (ii) Yadav Mohan Committee, (iii) The River Boards Act, 1956, Sections 15(4) and 22(i) (d), (iv) Letter dated 25th October, 1970, from the Chief Engineer, Rajasthan to the Chief Engineer, Gujarat and (v) Pench Project Agreement between Madhya Pradesh and Maharashtra, dated 18.3.1963....(3).

5.4.6 Gujarat has sought to repel these contentions of Madhya Pradesh mainly on an argument that these courses do not lay down any principle of or evolve a general legal liability of a downstream project to contribute to the costs of an upstream project. Regulated releases wherefrom are put to beneficial use at the downstream project. It appears, however, that Khosla Committee, in its report (G-83, p. 162) determined the liability of Gujarat at Rs. 13 crores irrespective of actual cost of the Punasa dam to be paid by Gujarat for the regulated releases to Madhya Pradesh but at the same time, the Committee felt that this could not be accepted "as a matter of principle particularly in view of the significant benefits which

(1) Guj. Written Reply No. 38, pp. 5-6.

(2) M. P. Written Submission Volume 13, pages 43—63.

(3) M. P. Written Submission Vol. XIII, page 63-64.

Madhya Pradesh would have derived from this regulated releases before they reach Navagam".... (1)

5.4.7 Gujarat has accepted this Report though in its Comments (G-181, p.12) it disputed the correctness of this amount and estimated this amount at Rs. 3.80 crores comparing advantages of additional power generation at Punasa, Barwaha and Navagam.... (2)

5.4.8 In these circumstances, I think, Gujarat ought to be prepared to pay for such regulated releases from upstream projects in Madhya Pradesh on a fair and reasonable basis, comparing mutual benefits of both the States on irrigation and power.

5.4.9 In order to derive maximum power benefits, Madhya Pradesh has planned a large reservoir at Narmadasagar and the regulated releases will be let down from Narmadasagar, Omkareshwar, and Maheshwar Projects as planned which will confer benefits on Sardar Sarovar Project. It is clear that without such regulated releases, Gujarat cannot utilise its full share of water allotted for Sardar Sarovar with FRL+458 on the basis of allocation of 10 MAF to Gujarat.

5.4.10 Thus the benefits of such regulated releases from Narmadasagar upto Sardar Sarovar project may be assessed by (i) determining the deficit quantity of water at Sardar Sarovar in the absence of such regulated releases resulting in loss of irrigation and power; or (ii) the extra cost that would have to be incurred in providing a larger storage at Sardar Sarovar to prevent this loss of irrigation and power.

Flood Moderation

5.4.11 As regards claim for flood moderation by Madhya Pradesh, I agree with the reasons and conclusions given in paragraphs No. 15.7.1 to 15.7.3 of Chapter XV(Vol. II) of the Report and hold that Madhya Pradesh State is not entitled to claim any payment from Gujarat on account of flood regulation or flood moderation.

ANNEXURE I

Regulated Releases to be made by Madhya Pradesh with an Apportionment of 10 MAF of Water to Gujarat in a Year of 75 per cent Dependability

Requirements at Sardar Sarovar with 10 MAF to Gujarat would be 11 MAF as under:—

Requirement of Gujarat	.	10·0 MAF
Requirement of Rajasthan	.	0·5 MAF
Evaporation losses from Sardar Sarovar		0·5 MAF
Total	.	11·0 MAF

It might be mentioned that an evaporation loss of 0.5 MAF had been worked out for Sardar Sarovar FRL+445. Although evaporation loss would be slightly higher for FRL+458, the same figure has been adopted.

For ensuring 28 MAF of water of 75 per cent dependability, there has to be a gross carry-over capacity of 8.35 MAF in the various reservoirs. Of this, the carry-over capacity at Sardar Sarovar has to be 3.13 MAF in proportion to water use. This carry-over capacity will not fill fully each year due to yearly variations in the river flows. It has been figured out that the carry-over capacity of 3.13 MAF will provide a yield of 0.88 MAF in a year of 75 per cent dependability.

The inflow of 75 per cent dependability below Maheshwar is 2.96 MAF as in Statement attached. The use by Madhya Pradesh and Maharashtra together downstream of Maheshwar works out to 1.776 MAF. This leaves a net availability below Maheshwar of 1.184 MAF (2.96—1.776).

With a requirement of 11 MAF at Sardar Sarovar, Madhya Pradesh shall have to make a regulated release of 8.936 MAF (11—0.88—1.184). This gives a monthly regulated release of

$$\frac{8{\cdot}936}{12} = 8{\cdot}745 \text{ MAF.}$$

STATEMENT I

Contribution from intermediate catchment between Narmadasagar and Sardar Sarovar (75% dependability) (Sardar Sarovar Reservoir Study) for FRL +455	5·16 MAF
Inflow between Narmadasagar and Maheshwar (75% dependability) (Ex. MP-326, Vol. I, p. 18)	(—)2·20 MAF
Therefore, contribution from intermediate catchment between Maheshwar and Sardar Sarovar (75% dependability)* .	2·96 MAF

*NOTE:—This is only an approximation as the yield at 75% dependability at two sites cannot be numerically deducted to get the intermediate yield.

Payment by Gujarat to Madhya Pradesh on account of Regulated Releases

5.4.12 I have determined 10.00 MAF as apportioned share of Narmada waters in favour of Gujarat and 17.25 MAF in favour of Madhya Pradesh. On the basis of the formula hereinbefore stated for finding out the costs and benefits ratio from the regulated releases, the same has been worked out in detail in Statements (1) to (5) hereto annexed. This, as worked out, shows total cost chargeable to Sardar Sarovar as under:—

		Rs.	
Power Component	=	5·82	crores
Irrigation Component	=	14·21	crores
Total		20·02	crores

5.4.13 The above figure represents 21 per cent of the cost of Unit I of Narmadasagar.

5.4.14 As the actual cost of construction of Narmadasagar may be different from the estimated costs, it would be proper to fix the amount on the basis of

(1) G-83, p. 162, Table 13·3.

(2) G-181, p. 12, paragraph (f), Annexure II.

percentage of the actual costs. Accordingly, I determine that Sardar Sarovar would be liable to credit to Narmadasagar each year 21 per cent of the cost of Unit I of Narmadasagar as shown in Statements 1 to 5 annexed hereto. The post-construction expenditure on maintenance shall not be considered as cost of construction.

Issues No. 13 and 18 are disposed of accordingly.

STATEMENT 1

Monthly Working Table for Narmadasagar for Meeting Irrigation Requirement in Madhya Pradesh
(For an Allocation of 10 0 MAF to Gujarat)

Figures in MAF

Month	NARMADA-SAGAR	OMKARESHWAR				
	Water available for down-stream use	Water require-ment	Evaporation loss of Omkaresh-war less regeneration	Total water require-ment	Inflow between Narmada-sagar & Omkaresh-war	Water available at Omkaresh-war (2+6—5)
1	2	3	4	5	6	7
July to October	7.763	0·306	0·045	0·351	0·552	7·964
November	0·615	0·153	0·009	0·162	0·016	0·469
December	0·385	0·120	0·009	0·129	0·008	0·26 4
January	0·143	0·153	0·009	0·162	0·006	(—)0·013
February	0·149	0·126	0·010	0·136	0·004	0·017
March	0·070	0·147	0·015	0·162	0·004	(—)0·088
April	(—)0·036	0·147	0·019	0·166	0·004	(—)0·198
May	(—)0·149	0·165	0·026	0·191	0·002	(—)0·338
June	0·140	0·158	0·017	0·175	0·006	(—)0·029
Sub-Total November to June	1·317	1·169	0·114	1·283	0·050	
Total for the year	9·08	1·475	0·159	1·634	0·602	

'In the absence of storage at Narmadasagar, there would be shortage at Omkareshwar during January to June, aggregating to 0.653 MAF. Live storage to this extent has, therefore, to be provided at Narmadasagar to meet the irrigation requirements at Omkareshwar.

2. There would be a surplus in November, December and February at Omkareshwar aggregating to 0.737 MAF which would be available for Sardar Sarovar.

NOTE:—The Working Table has been started from col. 9 of statement 15.1 of the report with extra 1.0 MAF i.e. 9.08 MAF of water available for downstream use.

STATEMENT 2

Reduction in benefits from Sardar Sarovar FRL+ 458 without regulated releases from Narmadasagar (For an allocation of 10.0 MAF to Gujarat)

Out of a 75 per cent dependable utilization of 28 MAF, Sardar Sarovar is to get 10.5 MAF for use by Gujarat and Rajasthan, with an evaporation loss of 0.50 MAF, the requirement there is 11.0 MAF. This would be possible by providing a carryover capacity.

In the absence of any carryover capacity, Gujarat and Rajasthan would be entitled to their proportionate share amounting to 10.13 MAF (9.65+0.48) out of a 75 per cent dependable flow of 27.01 MAF after deducting evaporation loss of 0.50 (0.15 during filling period and 0.35 during non-filling period) water available to Gujarat and Rajasthan would be 9.63 MAF (10.13—0.50) as against a share requirement of 10.5 MAF of 75 per cent dependable use, that is, 91.71 per cent. Of the requirement of 9.63 MAF, the irrigation use during the filling period would be 3.16 MAF (3.31—0.15), the same as for a use of 10.5 MAF. The inflow into Sardar Sarovar during the non-filling period would be 0.49 MAF, comprising 0.17 MAF from the free catchment and 0.32 MAF of regeneration inflow. Allowing for this inflow the live storage requirement at Sardar Sarovar would be 5.98 (9.63—3.16—0.49).

The gross storage capacity of Sardar Sarovar at FRL 458 . . .		7·965 MAF
Dead storage (+364)	3·00	
Silt reserve in live storage .	0·30	
	3·30	
Net live capacity (7·965–3·30)=		4·665 MAF

This capacity being short of the required 5.98 MAF, there would be spill of 1.315 MAF (5.98—4.665) from the available usable quantity of 9.63 MAF. Therefore, against 10.5 MAF use, Sardar Sarovar gets 8.315 (9.63—1.315), that is, 79.2 per cent. Thus, there is a reduction of 20.8 per cent in the benefits of Sardar Sarovar.

STATEMENT 3

Storage requirement of Sardar Sarovar without Regulted releases (For an Allocation of 10·0 MAF to Gujarat)

(1) Water requirement (including for Rajasthan and evaporation loss)		
(i) Filling period . . .	3·31	MAF
(ii) Non-filling period . .	7·69	MAF
	11·00	MAF
(2) Live Storage Requirement		
(i) Requirement of non-filling period . . .	7·69	MAF
(ii) Inflow in non-filling period from Omkareshwar (Statement I)		
Nov.	0·469	MAF
Dec.	0·264	MAF
Feb.	0·004	MAF
	0·737	MAF
(iii) Inflow in non-filling period from catchment below Omkareshwar 0·11 . .	0·847	MAF
Net requirement .	6·843	MAF
(3) Carryover capacity		
(i) Requirement for the entire system . . .	8·35	MAF
(ii) Share of M.P. proportionate to water use . . .	5·22	MAF
	3·13	MAF
(4) Storage requirement		
(i) Dead storage for MDDL+377 Corresponding to FRL 495 .	3·40	MAF
(ii) Silt storage . . .	0·40	MAF
(iii) Live storage . . .	6·843	MAF
(iv) Carryover capacity . .	3·13	MAF
TOTAL .	13·773	MAF

The flood cushion between FRL 455 and MWL 460 is 0·43 MAF. Providing the same in the present case, the capacity at MWL becomes 14·203 MAF corresponding to RL 498. The levels, therefore, are :

FRL .	+495
MWL .	+498

STATEMENT 4

Cost of Sardar Sarovar Dam

Gujarat, in its Exhibit No. G-1087 has furnished revised costs for FRL 530′ and MWL 540′ based on the 1975-76 prices. In these estimates cost of dam has been shown as Rs. 262.52 crores including cost of B-land. Cost of B-land at 530′ has been shown as Rs. 59.84 crores. On the basis of these costs, the costs of dam with FRL 458 and FRL 495 have been worked out below:—

I Cots of dam with FRL+458 & MWL 463

Ht. of dam upto MWL above foundation $= 463 - 5 = 458$ ft.

Cost of dam excluding B-land for FRL 458

$$202{\cdot}68 \times \left\{\frac{458}{535}\right\}^2 = \text{Rs. } 148{\cdot}54 \text{ crores}$$

Cost of B-land upto MWL 463

$$59{\cdot}84 \times \frac{104785}{328678} = \text{Rs. } 19{\cdot}08 \text{ crores.}$$

Total cost of dam FRL+458 = Rs. 167·62 crores

II. Cost of dam with FRL 495 & MWL 498

Height of dam upto MWL above foundation $= 498 - 5 = 493$ ft.

Cost of dam excluding B-land for FRL 495

$$202.68 \times \left\{\frac{493}{535}\right\}^2 = \text{Rs. } 172.11 \text{ crores}$$

Cost of B-land upto MWL 498

$$59.84 \times \frac{2,11,274}{3,28,678} = \text{Rs. } 38.47 \text{ crores}$$

Total cost of dam FRL + 495 = Rs. 210.58 crores

Therefore, the difference in the cost of the dam with FRL + 495 and FRL + 458 is (210.58—167.62) = Rs. 42.96 crores.

NOTE :—Land is to be acquired upto FRL and properties between FRL and MWL. However, as values of properties are not known, for the present purpose submergence upto MWL has been considered.

STATEMENT 5

Credit by Sardar Sarovar for Regulated Releases from Narmadasagar

(For an allocation of 10·0 MAF to Gujarat)

1. WATER USED FOR IRRIGATION

The use includes that for industrial and domestic purposes :

(a) Requirement at Narmadasagar for an allocation of 18·25 MAF	=	1·564 MAF
Therefore, for an allocation of 17·25 MAF= $\frac{1{\cdot}564 \times 17{\cdot}25}{18{\cdot}25}$	=	1·478 MAF
Downstream releases used for power . . .	=	9·08 MAF
Evaporation loss (MP-158 Vol. I p. 36) .	=	0·88
Distributing the evaporation loss between irrigation and power use, loss pertaining to irrigation is : $\frac{1{\cdot}478 \times 0{\cdot}88}{9{\cdot}08+1{\cdot}478}$	=	0·123 MAF

(b) Use at Omkareshwar would be total requirement minus inflow between Narmadasagar and Omkareshwar.

Total requirement = 1·475 MAF

Evaporation = 0·159 MAF

1·634 MAF

Inflow (—) 0·602

1·032 MAF

(c) Irrigation use at Sardar Sarovar is 10·5 MAF. Taking 20·8% of this the use attributable to Narmadasagar is:

$\frac{10 \cdot 5 \times 20 \cdot 8}{100}$ = 2·184 MAF

Total water use for irrigation = 4·817 MAF

2. WATER USE FOR POWER

Downstream releases from Narmadasagar . . . 9·08 MAF

Evaporation loss pertaining to power (0·88—0·123) . 0·757 MAF

Total water use for power . 9·837 MAF

3. APPORTIONMENT OF COST BETWEEN IRRIGATION AND POWER

Cost of Unit I (*Vide* MP-1056) . Rs. 95·38 crores

The cost is to be apportioned between irrigation and power in the ratio of water use, *i.e.* Irrigation 4·817 : 9·837

$\frac{95 \cdot 38 \times 4 \cdot 817}{4 \cdot 817 + 9 \cdot 837}$ = Rs. 31·35 crores

Cost chargeable to power = Rs. 64·03 crores

Total . Rs. 95·38 crores

4. POWER GENERATION AT DIFFERENT PROJECTS

(a) Narmadasagar

Power draft . . . 9·08 MAF

Effective head 2/3 (860—798)+ 798—648 . . . = 191 feet

Power generation at 100% LF

$= \frac{191 \times 1381 \times 9 \cdot 08}{14}$ = 171 MW

(b) Omkareshwar

Power draft
9·08—(1·475+0·159)+0·602 = 8·048 MAF

Effective head
2/3 (660-635)+635—534 = 118 feet

Power generation at 100%LF

$\frac{118 \times 1381 \times 8 \cdot 048}{14}$ = 94 MW

Power generation attributable to Narmadasagar

Flow in eight months of non-filling period is 8/12 x 8·048 = 5·365 MAF

Flow in non-filling period from Omkareshwar, when no regulated releases are made from Narmadasagar . 0·737 MAF

Therefore, flow attributable to Narmadasagar in non-filling period (5·365—0·737) 4·628 MAF

Power generation at 100% LF

$94 \times \frac{4 \cdot 628}{8 \cdot 048}$ = 54 MW

Attributable to Narmadasagar is :

(c) Maheshwar

Power draft 8·048 MAF

Effective head
2/3 (534—532)+532—457 = 76 feet

$\frac{76 \times 1381 \times 8 \cdot 048}{14}$ = 60 MW

Power generation attributable to Narmadasagar

$\frac{4 \cdot 628 \times 60}{8 \cdot 048}$ = 35 MW

(d) Sardar Sarovar

Canal head P.H.

Power draft 10·5 MAF

Effective head
2/3 (458—364)+364—307 = 120 feet

Power generation at 100% LF

$\frac{120 \times 1381 \times 10 \cdot 5}{14}$ = 124 MW

If there are no regulated releases from Narmadasagar the loss of irrigation and power at Sardar Sarovar Canal would be 20·8 per cent.

Therefore, power generation attributable to Narmadasagar is :

$\frac{20 \cdot 8 \times 124}{100}$ = 26 MW

Total a+b+c+d = 286 MW

5. POWER COST CHARGEABLE TO SARDAR SAROVAR

Amout chargeable

$\frac{26}{286} \times 64 \cdot 03$ 5·82 crores

6. IRRIGATION COST CHARGEABLE TO SARDAR SAROVAR

Irrigation use at Narmadasagar and Omkareshwar 2·633 MAF

Irrigation use at Sardar Sarovar attributable to Narmadasagar 2·184 MAF

Cost of Narmadasagar chargeable to irrigation is Rs. 31·35 crores.

Cost of chargeable to Sardar Sarovar is :

$$\frac{31 \cdot 35 \times 2 \cdot 184}{2 \cdot 633 + 2 \cdot 184}$$ Rs. 14·21 crores

4. TOTAL COST CHARGEABLE TO SARDAR SAROVAR

Power component	Rs. 5·82	crores
Irrigation component	Rs. 14·21	crores
Total	Rs. 20·03	crores

This represents 21·00 per cent of the cost of Unit I of Narmadasagar.

ALLOCATION OF COSTS OF SARDAR SAROVAR PROJECT

5.5.1 This is covered by Issue No. 17, which is as under:—

> "Whether the costs and benefits of the Navagam Project of Gujarat are required to be shared amongst the concerned States. If so, in what manner and on what terms and conditions?"

5.5.2 I agree with the statement of facts and also with the line of reasoning adopted in paragraphs Nos. 17.1.2 to 17.1.7 of Chapter XVII (Vol. II) of the Report. Taking into account the water used both for irrigation and power generation in Sardar Sarovar on the basis of allocation of 10.00 MAF to Gujarat and 17.25 MAF to Madhya Pradesh, the ratio of water used for these two purposes in a period of 100 years after taking 10 years for completion of Navagam would come to (as worked out in Annexure I annexed):—

Irrigation . . . . . 44·6 per cent

Power . . . . . 55·4 per cent

5.5.3 The cost of Unit I—dam and appurtenant works should, therefore, be apportioned between the two purposes in the above ratio.

Sharing of costs by Gujarat and Rajasthan

5.5.4 I agree with the line of reasoning adopted in paragraphs Nos. 17.2.1 to 17.2.5 of Chapter XVII (Volume II) of the Report. Accordingly, the irrigation component of the cost is shareable between Gujarat and Rajasthan in the ratio of their share of water 10 : 0.5 or 20 to 1. In other words, 1/21 of the costs has to be borne by Rajasthan.

5.5.5 I agree with the rest of the orders and directions as given in paragraphs Nos. 17.2.6 and 17.2.7 Chapter XVII (Volume II) of the Report.

Issue No. 17 is disposed of accordingly.

ANNEXURE I

Allocation of Costs of Sardar Sarovar Project—Unit I Only Between Irrigation and Power (10 MAF Allocation to Gujarat)

Ten years from the commencement of construction of Narmadasagar and Sardar Sarovar dams, besides the completion of these two, there would be Tawa, Barna, Bargi, Kolar and Sukta *vide* Madhya Pradesh's CMP No. 116 of 1977. At that stage the utilisation of Narmada water in Madhya Pradesh would be 6.00 MAF *vide* above referred CMP. As Navagam Main Canal is also expected to be ready by then, Rajasthan would be able to draw its full share of water of 0.5 MAF. Gujarat has envisaged full development of irrigation in a period of 30 years from the commencement of construction *vide* Exhibit G-177 Volume IV pp. 449-450. Full utilisation of its share of Narmada water by Madhya Pradesh is expected in 45 years from the commencement of construction. Water use, is, therefore, considered in three stages, namely after 10 years, 30 years and 45 years of the date of commencement of construction.

A. *At Ten Years from Commencement of Construction*

It is assumed that out of 10 MAF of water allotted to Gujarat, one MAF is assumed for Banni and Ranns and 9 MAF for CCA in Zones I to XI. In Exhibit G-177 Volume IV p. 447, it is stated that at the end of ten years of construction, Gujarat shall have utilised water in a CCA of 15.33 lakh acres, out of 54.05 lakh acres of CCA in the zones stated in Exhibits G-630 and G-630A/1. It should be possible to utilize 0.4 MAF in Ranns. The water use at the end of ten years from the date of commencement of construction, therefore, works out as under:—

		MAF
(1) Yield of catchment of 75% dependability . . .		27·01
(2) Drawn into Navagam Canal :		
(i) In Gujarat		
(a) Ranns	0·4	
(b) In Zones $\frac{9 \times 15 \cdot 33}{54 \cdot 05}$	2·55	2·95
(ii) In Rajasthan .		0·5
Total		3·45
(3) Utilization by Madhya Pradesh		
Actual use	6.0	
Regeneration	0·7	
Net use . . .		5·30
(4) Utilization by Maharashtra		
Actual use	0·25	
Regeneration	0·02	
Net use . . .		0·23
(5) Evaporation loss from Reservoirs . . .		2·13
(6) Water let down into the river =27·01—(3·45+5·30+0·23+2·13)		15·90

B. At 30 years from the commencement of construction :

1. Utilisable quantity of 75% dependability	28·0
2. Utilisation by Madhya Pradesh (by linear interpolation)	12·43
3. Utilisable quantum available from Madhya Pradesh's share	
17·25—12·43=4·82	
Less Regeneration at 10% =0·482	
Net available 4·82—0·482	4·34
4. Water taken into Navagam Canal	10·5
5. Water let down into river	4·34

C. At 45 years from the commencement of construction :

1. Drawn into Navagam Canal	10·5
2. Let down into river	NIL

The water use for irrigation and power is thus as under :—

MAF

From commencement of construction	Irrigation	Power		
		CHPH	RBPH	Total
At 10 years	3·45	3·45	15·90	19·35
At 30 years	10·50	10·5	4·34	14·84
At 45 years	10·50	10·5	Nil	10·5

The aggregate water use for the two purposes, irrigation and power, over a period of 110 years (allowing 10 years for construction) works out as under :—

MAF

Period from commencement of construction	Irrigation use	Power use
10 to 30 years	$\frac{3\cdot45+10\cdot5}{2}\times 20=139\cdot5$	$\frac{19\cdot35+14\cdot82}{2}\times 20=341\cdot9$
30 to 45 years	$\frac{10\cdot5+10\cdot5}{2}\times 15=157\cdot5$	$\frac{14\cdot84+10\cdot5}{2}\times 15=190\cdot05$
45 to 110 years	$\frac{10\cdot5+10\cdot5}{2}\times 65=682\cdot5$	$\frac{10\cdot5+10\cdot5}{2}\times 65=682\cdot5$
	979·5	1214·45

Hence percentage use for two purposes is as under :—

$$\text{Irrigation}=\frac{979\cdot5}{979\cdot5+1214\cdot45}\times 100=44\cdot646 \text{ say } 44\cdot6\%.$$

$$\text{Power}=\frac{1214\cdot45}{979\cdot5+1214\cdot45}\times 100=55\cdot354 \text{ say } 55\cdot4\%$$

PERIOD OF OPERATION OF THE ORDER OF APPORTIONMENT

5.6.1 Issue No. 15 is as follows:—

> "Should the apportionment of the waters of Narmada be made amongst the concerned States so as to be binding on them for all times or whether any, and if so, what period should be fixed for which, such apportionment shall remain binding?"

5.6.2 Gujarat has prayed for a direction, among other reliefs, "that the allocation of waters in accordance with the reliefs herein claimed be binding on the parties hereto only for a period of 40 years from the date of the publication of the decision of the Hon'ble Tribunal under Section 6 of the Water Disputes Act and to further direct that thereafter the said allocation be subject to reconsideration."(1)

5.6.3 Madhya Pradesh has opposed such prayer, mainly on the ground that under Section 5 of the Inter-State Water Disputes Act of 1956, the Tribunal has no jurisdiction to specify the limit of the period of operation of its Award.(2)

5.6.4 After considering the respective contentions of all the party States and the facts and circumstances of this case, I agree with the reasons and conclusions both on law and facts as contained in Chapter IX, para 9.9.1 to 9.9.8 of volume I of the report, so far as they relate to the period of operation and determine that the allocation herein made shall remain for a period of 45 years.

5.6.5 There is no provision for review of the order herein made in the Inter-State Water Disputes Act, 1956. The provision for review is contained in Order XLVII Rule 1 read with section 114 of the Code of Civil Procedure 1908. These provisions for review under the Code of Civil Procedure have been made applicable to any adjudication under the inter-State Water Disputes Act. In such case, a review will lie to the Court which passed the decree or made an order. As this Tribunal will cease to exist as contemplated under the provisions of the Inter-State Water Disputes Act, there will not be any scope for review of its order on and after the expiry of the said period of operation of 45 years.

5.6.6 Nevertheless, parties would be at liberty to take appropriate steps for reconsideration of all or any of the matters covered by the decision or order of the Tribunal on or after the expiry of said period of 45 years in accordance with law.

ORDERS AS TO THE COSTS AND OTHER INCIDENTAL MATTERS

I agree with the orders as to costs given in Chapter XIX of Volume II of the Report.

Advice of the Assessors

I had consultations with Assessors Dr. M. R. Chopra, Shri Balwant Singh Nag and Shri C. S. Padmanabha Aiyar on technical aspects of the matters covered by my decision. It is to be noted that the advice tendered by them were very helpful.

(1) Gujarat Statement of Case Vol. I; page 176, Clause 6.
(2) M. P. Written Submission, Vol. XV. pp. 48—73.

PART VI

Delivery awarded 12.12.79
V. Ramaswami chairman

FINAL ORDERS

In the view I have taken, I pass the final orders as follows:—

Clause I: Date of coming into operation of the order

The orders hereunder passed shall come into operation on and from the date of publication of the Report and decision of the Tribunal in the Official Gazette of India under Sec. 6 of the Inter-State Water Disputes Act, 1956.

Clause III: Apportionment of the utilisable quantum of waters of Narmada River

It is determined that the utilisable quantum of waters of the Narmada at Navagam Dam site on the basis of 75 per cent dependability, is assessed at 28.00 Million Acre Feet.

Clause III: Apportionment of the utilisable quantum of waters of Narmada River

It is hereby declared that out of the said 28.00 MAF of utilisable quantum of waters,

(a) Madhya Pradesh is entitled to a share of 18.25 million acre feet;

(b) Gujarat is entitled to a share of ~~10.00~~ million acre feet;

(c) Rajasthan in entitled to a share of 0.50 million acre feet; and

(d) Maharashtra is entitled to a share of 0.25 million acre feet.

Clause IV: With regard to excess waters and sharing of distress

(i) The utilisable flow of Narmada in excess of 28.00 million acre feet in any water year, *i.e.*, from 1st July to 30th June of next calendar year, is apportioned in the following ratio:—

Madhya Pradesh	69
Gujarat	40
Maharashtra	1
Rajasthan	2

(ii) In the event of available utilisable waters for allocation in any water year from 1st of July to 30th of June next calendar year falling short of 28 million acre feet, the shortage shall be shared between the concerned States in the ratio as under:—

Madhya Pradesh	69
Gujarat	40
Maharashtra	1
Rajasthan	2

(iii) to (v)

Orders under these clauses shall be the same as contained in sub-clauses (iii) to (v) of Clause IV of Chapter XX (Vol. II) of the Report.

Clause V: Period of Operation of the Order of Apportionment

My orders with regard to equitable apportionment as contained in Clauses III and IV above and all matters incidental thereto and/or connected therewith shall be subject to reconsideration at any time on the expiry of a period of 45 years from the date of coming into operation of this order.

Clause VI: Full Supply Level of the Canal

The full supply level of the canal off-taking from Sardar Sarovar is fixed at +300 with a bed gradient of 1 in 12,000 from head to mile 180, *i.e.*, upto the off-take of Saurashtra Branch. From that point to Rajasthan Border, the bed gradient shall be 1 in 10,000. These bed gradients may be altered by Gujarat and Rajasthan by mutual agreement.

Clause VII: Full Reservoir Level and Maximum Water Level of the Navagam Dam

It is hereby determined that the height of the Navagam Dam shall be fixed to suit full reservoir level +458 and maximum water level at +463.

Clause VIII: Sharing of Costs and Benefits

(a) It is hereby determined that out of the net power produced in Navagam at canal head and river bed power houses on any day, the share of the respective parties shall be as under:—

Madhya Pradesh .	57·5%	of power produced at Sardar Sarovar
Maharashtra .	27·7%	
Gujarat . . .	14·8%	

(b) Further following orders are passed as under:

(i) The power generated in the river bed and canal power houses at Navagam shall be integrated in a common switchyard.

(ii) Madhya Pradesh and Maharashtra shall be entitled to get 57.5 per cent and 27.7 per cent respectively of the power available at Bus Bar in the switchyard.

(iii) to (viii) and (ix) (a) to (d)

Orders under these sub-clauses shall be the same as contained in sub-clauses (iii)

to (viii) and (ix)(a) to (ix)(d) of Clause VIII of Chapter XX (Vol. II) of the Report.

(x) Madhya Pradesh and Maharashtra shall respectively pay to Gujarat 57.5 per cent and 27.7 per cent of the capital costs of the power portion of the Navagam head works, as worked out under sub-clause (ix) above. This amount shall be paid in annual instalments until the capital works are completed. Each instalment will be worked out on the basis of the budgeted figures of the concerned works at the commencement of each financial year and shall be set off and adjusted against actual figures at the end of the financial year.

(xi) In addition to the demands mentioned in sub-clause (x) above, Madhya Pradesh and Maharashtra shall also pay to Gujarat 57.5 per cent and 27.7 per cent respectively of the operation and maintenance costs of the Navagam power complex each year. These payments are also to be based on budgeted figures at the commencement of each financial year and shall be adjusted against actual costs at the end of the year.

Clause IX: Regulated Releases to be made in Madhya Pradesh for the requirement of Sardar Sarovar Project

By agreement between the concerned party States, the utilisable quantum of water on 75 per cent dependability in the Narmada at Sardar Sarovar Dam Site, has been assessed at 28.00 million acre feet and this has been accepted by the Order of the Tribunal dated 8th October, 1974. The actual in-flow of 75 per cent dependability, however, is 27.01 million acre feet, which has been brought up to utilisable quantity of 28.00 million acre feet, by means of carry-over in various reservoirs allowing for evaporation losses and regeneration. Out of this 28.00 million acre feet of water, 10.00 million acre feet has to be provided for Gujarat and 0.5 million acre fee for Rajasthan at Sardar Sarovar Dam Site. Thus the requirements at Sardar Sarovar will have to be met by releases from Narmada Sagar and by inflows from the intermediate catchments, surplus to the requirements of Madhya Pradesh below Narmada Sagar. If there is any variation of the actual inflow in the river system the releases from Maheshwar shall vary to that extent suitably.

The water available in the live storage of various reservoirs on 30th June, shall be reckoned as an inflow to be shared in the next water year. The releases to be made by Madhya Pradesh for Sardar Sarovar in a year of 75 per cent dependability on the basis of the height of the dam, namely, FRL 458 for allocation of 10.00 MAF to Gujarat works out to 8.936 MAF.

I direct that Madhya Pradesh should make yearly releases of 8.936 MAF with such modifications in any year as Narmada Control Authority may direct in consideration of the actual inflow available during the year. The releases necessary to ensure Gujarat and Rajasthan's share of water in a water year shall be made by Madhya Pradesh at a reasonably uniform rate permitting only such variation as the Narmada Control Authority may direct or approve. The regulation shall be by ten-day periods.

The total inflow into the river system during each ten-day period shall be computed by aggregating the inflow into the reservoirs of major and medium projects and one third of the use by minor and pumping schemes during the corresponding month in the previous year.

The rest of the orders in Clause IX shall remain the same as contained in the corresponding Clause IX of Chapter XX (Vol. II) of the Report.

Clause X: Payments to be made by Gujarat, Madhya Pradesh for regulated releases

Gujarat shall credit to Madhya Pradesh each year 21 per cent of the expenditure on account of Narmadasagar Project from the financial year commencing from the year of taking up of the construction of Narmadasagar Project. This will be initially credited on the basis of budget allotments to be adjusted at the end of the year on actual expenditure. The post construction expenditure on maintenance is not to be considered as cost of construction.

Clause XI: Directions regarding Submergence land, Acquisition and Rehabilitation of Displaced Persons

The Orders and Directions under this clause shall be the same as contained in the corresponding Clause XI of Chapter XX (Vol. II) of the Report.

Clause XII: Allocation of Costs of Navagam Project between irrigation and power

It is determined that the cost on Unit I—Dam and appurtenant works, shall be apportioned between Irrigation and Power as follows:—

Irrigation	..	44·6 per cent
Power	..	55·4 per cent

Clause XIII: Allocation of Irrigation component of costs on Navagam Project between Gujarat and Rajasthan

(a) The irrigation component of costs of Unit I of Sardar Sarovar Dam and appurtenant works shall be shared by Gujarat and Rajasthan in the ratio of their share of water 10:0.5 or 20:1. In other words 1/21 of the cost has to be borne by Rajasthan.

(b) Orders in sub-clause (b) of Clause XIII shall be the same as contained in the corresponding sub-clause (b) of Clause XIII of Chapter XX (Vol. II) of the Report.

Clause XIV: Setting up of Machinery for implementing the decision of the Tribunal

The Order for setting up machinery for implementing the decision of the Tribunal shall be the same as contained in the corresponding Clause XIV of Chapter XX (Vol. II) of the Report.

It is further ordered that notwithstanding anything contained in any of the provisions of the directions and orders as contained in Clause XIV—Part A above, all the concerned party States shall be at liberty to modify or make suitable changes thereof, if necessary in future, only by mutual agreement between all the party States, namely, Madhya Pradesh, Gujarat, Maharashtra and Rajasthan for carrying out and implementing or giving effect to the orders and directions herein made.

Clause XIV: Part-B—Directions regarding Rules or Regulations and Water Accounting

Detailed Rules and Regulations and water accounting shall be framed by the Narmada Control Authority—hereinafter called, 'the Authority'. For framing these Rules and Regulations, the following terms shall be closely observed:—

(i) The 28.00 million acre feet of utilisable supplies of 75 per cent dependability in a water year (1st July to 30th June next year) shall be shared by the party States as under:

Madhya Pradesh	..	17·25 MAF
Gujarat	..	10·00 MAF
Rajasthan	..	0·50 MAF
Maharashtra	..	0·25 MAF
		28·00 MAF

(ii) Surplus or deficit utilisable supplies in a water year shall be shared to the extent feasible by the party States in the same proportion to their allotted shares in sub-clause (i) above.

(iii) to (xiii) The rest of the orders or directions under these sub-clauses, shall be the same as contained in the corresponding sub-clauses (iii) to (xiii) of Clause XIV, Part—B of Chapter XX (Vol. II) of the Report.

Clause XV: Orders as to the cost of the Proceedings

The States of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan shall bear their own costs of proceedings before the Tribunal. The costs and expenditure of the Tribunal shall be borne and paid by the aforesaid four States in equal shares.

NEW DELHI;
August 16, 1978.

(Sd.) A. K. SINHA,
Member.

—17 Agri.—1,000

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