



International Environmental  
Law Research Centre

# **COMMENTS ON THE REPORT OF THE INDEPENDENT REVIEW SESSION ON SARDAR SAROVAR PROJECT**

**GOVERNMENT OF GUJARAT**

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## TABLE OF CONTENTS

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1.	INTRODUCTION	1
2.	TRIBAL PEOPLE AND THE VALLEY	2
	References	3
3.	RESETTLEMENT AND REHABILITATION	4
	Introduction	4
	Independent Review's Overall View and Policy Recommendations	4
	Fodder, etc.	6
	Rock Filled Dyke Village	7
	Gadkoi village site	8
	Pachisgam	9
	Malu	9
	Krishnapura	9
	Amroli	9
4.	ENVIRONMENT: CONTEXT AND COMPLIANCE	10
	Upstream Environment	11
	Upstream Environment	13
	Down Stream Environment (Including Fisheries)	16
	Lack of Information	16
	Basic requirements	16
	Fisheries	17
	Command Area Environment (Waterlogging & Salinity)	17
5.	HYDROLOGY AND WATER MANAGEMENT	18
	Appendices [not reproduced]	27
6.	DRINKING WATER SUPPLY	27
7.	PUBLIC HEALTH	29
8.	COMPLIANCE TO CONDITIONS OF PROJECT CLEARANCE	33

## 1. INTRODUCTION\*

The Sardar Sarovar Project consists of a dam and power project and an irrigation and water supply scheme. It includes a 139 m. high concrete dam, a 1,200 megawatt power house, transmission lines, a water conveyance system including the Narmada Main Canal (460 kilometers and 40,000 cusecs) to the Rajasthan border, and 31 branch and a large number of distributory canals.

The project will irrigate about 2 million hectares of land in Gujarat and another 20,000 hectares in Rajasthan; provide drinking water for at least 30 million people and over 8000 villages in dry and semi arid and highly uncertain rainfall conditions and supply over 5 billion units of electric power.

The Project will accelerate Gujarat's agricultural growth to over 5% compound annual and will provide a major land and water sustainable development plan for each one of its 13 agro-climatic regions. It will have a decisive impact on poverty and unemployment in the State.

The blueprint of Sardar Sarovar was honed in the early Eighties through planning methodologies which included a number of innovations. The command area was sub-divided into 13 agro-climatic regions based on climate, (temperature, average & distribution and rainfall, average and distribution), soil conditions, ground water and surface water regimes and other characteristics essential for irrigated agriculture. A massive research effort was mounted to study the behavioural responses of the Gujarati farmer to the availability of limited quantities of irrigation water, the purpose being to design the delivery system taking into account expected economic outcomes and the farmers' responses. Every university and research institute in the social sciences in Gujarat was involved in conducting socio-economic benchmark studies in each taluka (sub-region) of the command. Drainage and ground water models were developed for the first phase of the project and extensive observation wells set up to monitor ground water. The project was designed to supply limited quantities of surface water and to preclude waterlogging, the farmer was to be encouraged to pump out ground water but if he did not do so, since ground level water were monitored on a 15-day basis, the water would be pumped out by the Project authorities and conveyed back into the irrigation delivery system which was designed for this purpose. Behavioural studies of the Gujarati farmers cropping responses and the requirement to generate employment for the predominantly scheduled caste and scheduled tribe landless labourers were used to develop econometric and programming models to design the capacities for the branches and distributories. A specialized environmental prognostication study was completed. An independent Planning Group insisted on realistic information being used to work out costs and benefits. For example, thousands of crop cutting experiments of farmers' fields were used to work out the benefits of irrigated agriculture by number of watering, cost of cultivation studies were retabulated to work out the costs and the profitability of irrigated agriculture and computer models used to design the irrigation network and its costs realistically.

Expertise was used within India and the world. The hydrology of the dam was studied through real time with ten daily flows, at different stages of irrigation development, alternatives of stages of development of the number of dams in the entire valley and under different climatic conditions. Dynamic hydraulic studies were used to design technical parameters of the largest irrigation canal in the world and computer controlled irrigation system designed with electronic controls up to the level of each village and measurement designed below that to the field.

A detailed census was done of all project affected persons by one of the country's leading social science research organisations. A policy making set-up was established to oversee the rehabilitation system under a respected and powerful political leader of tribal origin in the state. The plan was published and discussed openly. Criticisms were welcomed and non-governmental organisations involved.

No wonder even the World Bank, a somewhat conservative funding body, declared that 'the Sardar Sarovar Plan represents a break with past approaches to the planning, design and construction and operation of irrigation projects in India' and again 'within a period of 3 years an impressive array of high quality studies and designs have resulted, including a comprehensive framework plan by the Narmada Planning Group and production by the Irrigation Department of high quality designs, specifications and procurement documents'. These improved planning procedures are now proposed to be extensively used in India in other projects. Gujarat will strengthen the planning machinery, and maintain its autonomy and primacy in the project machineries.

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\* This response of Govt. of Gujarat is mainly based on the report of the High Level Group headed by Prof. Yoginder K. Alagh of Sardar Patel Institute of Social and Economic Research, Ahmedabad.

The World Bank set up an Independent Review under the Chairmanship of Mr. Bradford Morse in 1991. With characteristic openness, the Review Missions were welcomed in the State. Some of the members knew outstanding individuals in Gujarat. The elected leadership and the official machinery and non-governmental organisations and the press took keen interest in the Review and there were considerable expectations that the Sardar Sarovar plan which had been built in the early eighties, would be subjected to constructive review and particularly of the rehabilitation and environmental studies, where considerable developments have taken place in the last decade and that the Review would examine progress and give constructive proposals for improvement.

The Independent Review report presented in June 1992 was highly disappointing. The Review ignored the entire planning studies and the vast amount of data, methodological improvements and improved policies which were brought to play in the project. It criticised the hydrology of the Project without once referring to 51 pages and more than 17 tables in the Master Plan which demonstrated conclusively that adequate water was available. It talked of waterlogging in the project by pointing out that delivery losses would be higher than those planned by referring to other projects and ignoring the actual measurement used from delivery of water in structures of the kind proposed to be constructed in the Sardar Sarovar system. It ignored socio-economic structures developed by painstaking studies of the tribal population to be affected, by one of India's leading social science research organisations and superimposed views of colonial and British anthropologists which treated tribals as noble savages to be protected from the mainstream. The Review made extremely uncultured remarks on India's religions and went out of the way to be sarcastic on the leadership of India's freedom movement. This report is privileged to present a point by point rebuttal of the intellectual bankruptcy parading as arrogance of the so called Independent Review.

## 2. TRIBAL PEOPLE AND THE VALLEY

The analysis of tribals and Hindus in the Independent Review is based on poor evidence, deliberate misrepresentation of the major streams of social anthropological study done within India and outside and most unfortunate comments on India's freedom movements and its traditions. Consider the following statement:

'Dr. Padel told us that since the 1940s, there has been a tendency in some sections of Hindu society to claim that tribal peoples are just a poorly integrated part of the mainstream culture of India' (p.67). The IR reviles the Indian social anthropologist G.S. Ghurye. 'His arguments have their place in India's nationalist movement. Ghurye sought to avoid an emphasis on tribals indigenous status that could appear politically divisive.' (p.67)

The Independent Review's observation regarding the tribal people of the Narmada Valley is based on all the prejudices of the colonial ethnographer's and the British administrator's perception of tribal society in early literature. Thus while Indian social anthropologists are given passing references or criticized, not very well known British scholars or censuses conducted during the colonial period are referred to extensively.

Jawaharlal Nehru, who is the butt of tasteless sarcasm in the first sentence of the Morse 'Independent Review', in his fore word to the second edition of 'A Philosophy for NEFA' by Dr. Verrier Elwin, wrote on 9 October 1958:

'We cannot allow matters to drift in tribal areas or just not take interest in them. In the world of today that is not possible or desirable. At the same time we should avoid over-administering these areas and in particular, sending too many outsiders into tribal territory. It is between these two extreme positions that we have to function. Development has to be ensured in various areas, such as communications, medical facilities, education and better agriculture.'

In this region the tribals and non-tribals have historical links. Since the twelfth and thirteenth centuries the Rajputs had established friendly relations with the Bhils. There are instances which show that many Rajput chieftains took and accepted the help and assistance of Bhils in their war against enemies. The classic example is that of Rana Pratap of Udepur who took refuge among the Bhils of Aravalli hills. It is believed that Rajputs in early days used to intermarry and eat either with the Bhils, who were regarded not as menial tribes, but as lords of the soil (Russel and Hiralal: 1916). Malcolm and Grierson shared the view that the Garasias are descendants of Rajputs by Bhil women (Malcolm: 1827; Grierson: 1968). Allchin has pointed out that in Western Central India the Bhils who are now agriculturists, have absorbed a great deal, both physically and culturally, from the many waves of invaders who have entered from the north-west or rather from the people displaced by each wave of invaders (Allchin : 1966). Majumdar was of the opinion that the Bhils have clearly acquired agricultural techniques from more advanced people, possibly at the same time absorbing new ethnic elements. A clear example of this is to be found among the

north-western Bhil groups who have acquired many Rajput characteristics from the fugitives of the Rajput wars who took refuge with them (Majumdar: 1961). Thus, it is clear that in this valley region, Hindu culture is impacting with the indigenous Bhil culture and this is taking place as a process through several centuries. This had been greatly facilitated on account of the racial and cultural intermingling between the Bhils and the Rajputs.

From the foregoing discussion it is clear that the tribals in this region had been interacting with Hindu population (later also with Muslim population) through historical time. In the face of the penetration into the tribal area of the benefit of science, new technology and improved communication, the interaction has greatly accelerated in recent times and as a consequence of this, they are getting more involved with and interdependent with the outside world.

Mahatma Gandhi and Thakkar Bapa also tried to raise the conscience of the Nation to the wrong inflicted upon tribals during the pre-independence period. Gandhiji set up the Bhil Seva Mandal which is a distinguished predecessor to many voluntary organisations working in this area. Mahatma Gandhi taught the region to consider the cause of Adivasis as one of the most urgent ones (Bose: 1960).

All the tribal groups in the Narmada valley (Gujarat, Madhya Pradesh and Maharashtra) speak dialects which belong to the family of Indo-Aryan language, the non-tribals' languages in these regions also belong to the same family of languages. Morse and Berger have no time for these niceties.

The Independent Review refers to Censuses in British India but in 1961, 1971, and 1981 censuses, nearly all the tribals of the Narmada Valley have referred themselves as belonging to the Hindu religion in their census return form. It is quite clear that the Independent Review has systematically chosen to ignore historical evidence running across centuries and well documented as shown in this report. It has ignored the work of Gandhiji and the approach of social anthropologists like Verrier Elwin and others and has chosen to present an extremely distorted vision of Indian society to make the unsustainable claim that Hindu India falsely tries to integrate tribals within itself to force the unification of India.

Indians of tribal origin are a basic part of the society. Hinduism in India does not exclude them from its ambit as suggested by some individuals quoted by the Independent Review. Persons of tribal origin have to be supported to take advantage of development opportunities emerging in the economy taking into account the levels of development achieved. It is wrong to expect that persons of tribal origin in one State will not move to an adjoining area in another state on account of a 'long cultural journey'. Needless to say there can be no question of a policy of damping human rights to a significant section of Indian society, like its citizens of tribal origin.

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### 3. RESETTLEMENT AND REHABILITATION

#### Introduction

The terms of reference (TOR) of the Independent Review are very specific. They include:

‘Implementation of the on-going Sardar Sarovar Project as regards:

(a) the resettlement and rehabilitation (R&R) of the population displaced/affected by the construction of the SSP infrastructure and storage reservoir.’

Also ‘The assessment shall take account of all covenants and understanding reached between GOI and IBRD/IDA in the loan/credit documents.’

The IR admits ‘Our Terms of Reference require us to consider all the Bank’s existing operational directives and guidelines on R&R, bearing in mind that the credit and loan agreements for the SSP were approved in 1985.’

The IR however is not particularly concerned about the work requirement of the TOR and takes on with great zeal a larger more general (in the sense of non-specific) role.

The Independent Review states ‘In approaching our task, we have taken a position that our assessment is not simply a question of determining compliance or non-compliance with the Tribunal Award and loan agreements. Compliance or non-compliance is not a pro-presumption. The conditions laid down by the Bank relating to resettlement and rehabilitation and amelioration of environmental impact are conditions intended to address underlying issues.’ (p. 10). To use their language, compliance is not ‘a question of problem solving, of looking at the implementation of policies adopted by Bank, India and the three States and working out ways of improving it.’

In view of this somewhat cavalier attitude taken by the Independent Review to its well defined task, it becomes very difficult to discuss its findings and recommendations particularly on rehabilitation and resettlement issues.

In a fundamental sense the Independent Review does not have a cogent treatment of the problem or their terms of reference. This of course, is admitted by them. By a circuitous process of reasoning they try to make a virtue of this neglect of their responsibility, so that attention can be paid to their obiter dicta on the project as a whole. But that is a wider question since the Review’s comments on the project’s costs and benefits are also prejudiced in the sense of not being based on facts available to them as shown elsewhere in this Report. To the extent some inferences of a recommendatory nature are there in the Independent Review, for action, these are taken first. Some of these are substantive issues since the welfare of the PAP’s may be involved. Many of them have been recommended earlier by groups within the SSNNL, the Narmada Planning Group, and voluntary organisations. The Independent Review has also made a large number of unconnected and in some cases desultory comments of a factual nature. These are not based on facts, in many cases ignore material made available to the Review and are incorrect. To set the record straight, we have contradicted these untrue statements.

#### Independent Review’s Overall View and Policy Recommendations

The Independent Review have decided on grounds not spelt out in any degree of clarity that feasible resettlement and rehabilitation policies do not exist in Gujarat or any other State. Thus they say ‘Could the implementations of resettlement and rehabilitation be done in time. We have reluctantly concluded – No’ The Review however do not tell the reader why they have thus concluded - reluctantly or not. This assertion is not based on any detailed analysis and can be conclusively demonstrated to be incorrect.

The progress of resettlement and rehabilitation in Gujarat is as follows:

Sr. No.	Item	Unit	Gujarat	Maharashtra	M.P.	Total
0	1	2	3456			
1.	Allotment of land	No.of PAPs	3753	424	765	4942*
2.	Area allotted	hec.	7485	865	1530	9880
3.	Amount of subsidy	Rs. in million	12.81	0.92	0.17	15.44

Thus around 5000 project affected persons have already been resettled in around 10000 hectares of land.

The counterfactual that the rehabilitation and resettlement policy is continuing in relation to the construction programme of the dam has been conclusively established in a demonstrable manner. The Independent Review simply ignores this.

The more important aspect slurred over by the Independent Review is that an accepted rehabilitation and resettlement plan for all project affected persons accepted by all States already exists. This programme is phased according to the details of the construction programme of Sardar Sarovar and needless to say can be honed further according to requirements. In Gujarat 19 villages are involved and the R&R process is nearing completion. In Madhya Pradesh the major resettlement requirements will arise in 1997/98 when 163 out of 193 villages affected in all, will have to be taken up. According to the available information around 90% of the affected farmers (21057 out of a total of 23180) will need to be taken up then. In Maharashtra around 80% of the villages (28 out of 33) and two thirds of the affected farmers (1815 out of 2464) will need to be relocated from 1994-95 onwards. The fact that sufficient lead time exists to complete the process and that the progress already achieved gives clear indications of feasibility is ignored in the Independent Review.

An interesting proposition regarding feasibility not dealt with at any length, is the policy option already under way, that Gujarat has offered to rehabilitate as per its own policy packet, all project affected persons, who are willing to move to Gujarat from Maharashtra and M.P. Thus a feasible solution exists - apart from the efforts already initiated in Maharashtra and Madhya Pradesh. In fact the reason that a number of PAPs may not want to move, (according to available indications around 25% in Maharashtra and 50% in M.P.) is on account of the fact that they will be partially affected and would like to keep their lands not affected and assets and get rehabilitation benefits and not the 'cultural' distance of tribal groups in those States from Gujarat.

The Independent Review at a number of places bemoans the fact that the oustees are not relocated at a single place as a community. They ignore the fact that the oustees chose not to be relocated at the same place, and move in smaller clusters. While the independent Review quotes some observations of Mr. Scudder (not based on any detailed study of the region) the very detailed work of the Centre for Social Studies at Surat, of the 19 villages in Gujarat to be submerged is ignored on this question. Field work through years showed that the ethnic groups living in these villages have differentiated social and economic interests and as such different sub-groups would pursue their own interest. Hence the Gujarat policy which gives choice to a household to relocate at a place of their selection is fundamentally sound. The Independent Review has no time for such detailed findings.

Kevadia Six Villages: Total cultivable area is 2792 acres, out of which 1779 acres was acquired from 334 landholders. Compensation amounting to Rs.0.33 million was paid. The work of land acquisition was over by 1962-63, i.e. 22 years prior to the execution of agreement with the World Bank. 666 persons from these villages have been provided permanent or semi-permanent jobs with the Nigam itself and many more with the contractors at dam-site. The compensation rate was decided according to various classes of land: between Rs.100 to Rs.250 per acre in 1962/63. This was consistent with similar cases pertaining to this period. The Government had treated this issue with an open mind and had been in constant dialogue with the people. The District Magistrate and Collector were involved in the negotiations and when a large majority of these representations were examined an alternative package was considered. Then this was also followed by negotiations with the representatives of local people. A provision of Rs. 200/- per acre was given. The value of Rs.200 together with cumulative interest as applicable to Government

\* Note : Up to June 1992, The figure has now crossed 5000.

Securities would be Rs.6400 in 1992. A sum of Rs.7000/- per acre now is in addition to the payments in 1962, The Government requested some academicians and NGOs to study this problem and arrive at agreed solution. The Government of Gujarat has issued a Resolution on 19-8-92 under which a suitable package has been evolved.

Section 144 is a provision under the Criminal Procedure Code and is a preventive measure to ensure law & order. The Official Secrecy Act is an Act for providing safety to the classified information of the Government. The two are not related with each other. The Independent Review refers to the area being placed under Section 144 of the Official Secrets Act, whatever that means.

It is incorrect to imply that the affected persons in the six villages have not met the Chief Minister, or concerned Minister. (Independent Review, p.93). The Chief Minister had assured the oustees of R&R package short of declaring them as PAPs. Declaring persons 'oustees' after twenty or more years can create obvious legal and practical problems. The way out is to implement quickly a reasonable compensation package to solve this problem.

The Independent Review has highlighted the problem of canal affected persons. The Independent Review has unfortunately not considered the question of persons affected by the construction of the main canal and distribution system with the detailed consideration that it deserved. Households from whom land has been taken for the canal system to begin with will be the major beneficiaries from the development of the command. Using some incomplete sample a study sponsored by the SSNNL had arrived at some estimates of exaggerated persons affected by the construction of the SS Distribution system. The available facts reveal that for the construction of the Main Canal, Branch Canal and Distributories, lands are likely to be acquired from about 1,69,500 persons; of these 1,46,000 persons will only lose less than 25% of their holdings, 15,800 persons will lose between 25% and 50% of their land, 5,000 persons are expected to give up between 50% and 75% of land, about 2,000 persons will lose between 75% and 100% and only about 750 persons are expected to lose the total holdings. These persons are scattered over 12 districts of Gujarat State. It is proposed to have a socio-economic study of Canal Affected Persons and complete the same by March, 1993 end. It has been recognised that Canal Affected Persons especially those who are small and marginal farmers, who lose their entire land must be compensated properly. Adequate compensation be given to all households. Special care must be taken to see that small and marginal farmers who lose their land in the process be compensated in terms of replacement cost of the land lost to enable them to purchase land of adequate quality or alternative productive assets in lieu thereof. This process of valuation will be carried out through a Land Purchase Committee of the kind existing for PAPs.

A suitable package has been announced on 19-8-92 for such households by GOG. A system of Lokadalats will be used, to process the claims regarding compensation expeditiously outside the Civil courts.

### **Fodder, etc.**

The IR is critical of GOG policy for not providing land for grazing, fodder and fuelwood. The ground level situation needs consideration. First of all, the oustees have chosen to settle in small groups in already existing villages. These villages have their own common property resources. However, arrangements for fodder are being examined. A fodder farm has been opened at Parveta. Also, a mobile depot of fodder has been operationalised. NGOs are also involved in providing bio-gas plants and training in stall-feeding. PAPs are getting settled at new locations where they will adopt suitable cropping patterns. These would also add on to the fodder base by crop residue and growth of cultivated green fodder. However, as a measure of abundant caution and considering the intrinsic value of the activity that the Forest Department will prepare a community fuel and fodder programme for the villages with substantial PAPs for approval by the Government in the current Annual Plan.

#### **Strengthening of R&R Organisation**

Government of Gujarat has already established a separate Organisation to implement R&R policies. The Executive Director (Reh) has been delegated adequate powers to deal with implementation issues. He is also assisted by NGO Committee which has been empowered to take decisions regarding implementation.

Govt. has also decided to further strengthen this Organisation with 2 more Divisions to deal with (1) Infrastructural Development (2) Inter-State Problems. This Organisation will also have skills in social welfare, public participation, revenue administration and land development, land use and settlement planning including rural housing, and

overall disciplines of management will be created to plan and implement the rehabilitation programme. Such an agency would also provide adequate support to the NCA and GOI to coordinate and implement the rehabilitation programme. This agency would coordinate with participating sister states in exchanging experiences in rehabilitation and would adequately provide liaison with NGOs and take a proactive role in monitoring the progress of rehabilitation as a whole in the project.

#### Specific Page-wise Comments on IR Observations on Gujarat

Introducing the next section it is important to repeat that there are a very large number of factual errors in the Independent Review's chapter on rehabilitation and resettlement. Some are not of high significance in terms of policies and action - but others are. Taken together they show a degree of disregard of facts, incorrect and/or untrue statements, which most certainly present a picture of prejudice against the project authorities - defined in the strict sense of untrue statements or setting aside of available facts in order to arrive at prejudicial conclusions. In addition in many cases the conclusion that emerges in one of inefficiency in the sense of carelessness. We discuss such instances -each one briefly - in the next seven pages.

It is true that the Gujarat Policy as set out in 1979 Government Resolution was limited, as compared to the policy now, but it did provide basic facilities for resettlement like grant of agricultural land up to 5 acres to landed oustees, plot for residential site, electricity connection, rehabilitation grant and other civic amenities. The source for grant of agricultural land was from government land. Hence, it is factually untrue for the Independent Review to state that the Policy was based on cash compensation. Compensation at the rate of Rs.4600/- per acre was paid in installments in 1982-83, and the oustees were assisted in purchasing private lands. In the 5 dyke villages, 532 ha. of land was acquired at a cost of Rs. 7.73 million and so far 1323 ha. has been allotted at a cost of Rs.34.84 million.

'The most serious threat to achievement of resettlement and rehabilitation policies may well be in the entanglement in debt cycles, and the resultant loss of land to money lenders or local landowners', according to the Independent Review.

The apprehension of entanglement of debts and money lenders grabbing the land is totally without foundation. In none of the 14 Monitoring and Evaluation studies carried out by independent highly rated professional agencies is there a single instance of this type reported. Moreover, in the Report of the Independent Review no evidence is given nor any instance quoted. The State administration or NGOs have also not come across any such cases. The Mission did visit rehabilitation sites where dyke villagers have been resettled for nearly a decade now and recorded their impressions but nowhere are such instances reported by them. This statement is not based on fact.

Similar is the case of apprehension about the rehabilitation aspects of resettlement programme. The dyke villages' resettlement sites are about 8 to 11 years old. The Mission has not bothered to examine rehabilitation aspects in these old sites, where the PAPs have taken roots in their new environment but have concluded that in Gujarat rehabilitation is a set of promises about the future.

The NWDT Award provisions quoted on page 132 is not correct. Nowhere in the Tribunal Award is there a mention of Gujarat villages whose rehabilitation is to be completed by 1983.

### **Rock Filled Dyke Village**

Page 96-Para 3 commencing from 'oustees for dyke villages'

The Report has referred to the position of some of the families which were staying at the edge of the rockfill dyke. The land of these families were not under acquisition because they were outside the submergence level. However, considering the social isolation they would suffer after the filling of the dykes, the Government has decided to acquire these remaining lands and accord them the same benefits as those of oustees. In fact the Govt. of Gujarat has issued a special Government Resolution for acquisition of such isolated lands in the entire submergence area. The G.R. No. is NCA/1090/7/D dated 15-6-90. It has been mentioned in para 4 that the land purchased so far, the average comes to 0.8 ha. This does not seem to be correct as can be seen from the figure given below of December 1991;

Land Purchased 383 ha.	No. of purchasers 194	Average 2.00
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In January 1992, 593 families have received 1147 ha. of land. This information was given to the Independent Review, The Independent Review has chosen not to reflect it in Table 6.3.

Page 97 - In Table 6.2 the number of relocation sites have been discussed. However in the column of Talukas, the total is shown as 27, thereby conveying the sites referred to are situated in 27 talukas. This is a complete misrepresentation of facts. The resettlement of dyke villages is only made in 9 talukas. House holds from the dyke villages have been relocated in Nandod, Dediapada Talukas of Bharuch district and also in Sankheda, Naswadi, Tilakwada, Dhabhoi and Waghodia Talukas of Vadodara district. Such misrepresentation creates serious adverse imagery about the dispersal of resettlement sites of dyke villages which is untrue. The Independent Review's report has committed serious errors of this type at several places.

### **Gadkoi village site**

The Independent Review has discussed the Gadkoi rehabilitation in detail (pp.98-100). It is true that the site is near Kevadia colony. Originally when the compensation of Panchmuli village was paid, 6 families had purchased 13.35 ha. of land in 1983-84. The purchase of this land was made after negotiation in Purchase Committee. The rate of purchase per acre was Rs.5200. The number of entitlements in these families has now increased to 19 because of the retrospective liberalisation and new cut-off date for major sons. These have to be taken care of. The Independent Review makes this out to be a case of deliberate underprovision of land. The fact that the change in status is recent has been ignored in the Report of the Independent Review.

The Review has commented on the lack of irrigation facilities at this site. The entire piece of land purchased is covered under irrigation.

The Independent Review had verbal discussion with the people of Gadkoi. It has been mentioned that there was no doctor at the old site and also there is none at the present site. Gadkoi is only three Kms. from Kevadia where a full-fledged hospital is situated. There is a sub-primary health centre at Zaria only 2 Kms. from this village. The

Review representative should have analysed this complaint with reference to the factual position, but chose to ignore the facts.

'The allotment of land to the rockfilled dyke villagers'. As on February 91 figures have been shown in Table 6.3. The Executive Director of the Nigam had sent a FAX message to Mr. Brody on March 30, '92, in which the progress of R&R up to January 92 was conveyed. According to this, 593 persons were allotted land by January 1992. The suppression of these facts is serious since it affects the conclusions of the Review on the performance of the R&R for rockfill dyke villages.

From page 106, para 1 onwards the report discusses the choice of land by the oustees. It has been mentioned that since 1990, families do really select land they wish to move to, and the oustees are free to choose or reject the alternatives offered to them. The Independent Review thus goes to considerable length to point out that selection of land is based on factors of an economic nature. It wants to convey that social aspects are not taken care of. This is an incorrect representation. To begin with economic criteria are important and as discussed earlier detailed studies showed that it was not necessary to relocate all households in a village. There may be sub-groups who perceive their interest as separate from other groups. Also selection rights on land is a powerful right which the Review should not erode. The fact that the selection is based on economical consideration, does not mean that other factors are ignored. In fact a detailed analysis shows that the Bhils select lands where there is a Bhil population. Thus if a detailed analysis of sites is also taken up, it would be found that even in one relocation site there are a number of oustees from other submerging areas. Resettlement is therefore based on group associations also. The Independent Review has therefore made considerable comments on the 'human relocation centers on non-economic factors' and yet it has examined neither the structure of the tribal societies in the villages to be submerged nor of the clusters being relocated in any depth.

## Pachisgam

The Independent Review has narrated its visit to Pachisgam. It interviewed the first person whom they met while entering the village. In the subsequent para it has been mentioned that the 3 brothers complained that their father had not been included in the list of oustees. In the subsequent visit, after 3 months, the Mission found that the same complaint persisted. This is one of the stories on which the Review has relied on its theory of non- fulfillment of promises. However, the issue was examined in detail and The High Level Committee find that the father of the 3 persons, Dhariabhai Dheerabhai, was not staying in the old village Kadada at any time. His name does not figure in the basic survey of C.S.S. made in 1980s nor does his name appear in any of the Electoral rolls of the village or other surveys made by Nigam. In fact it has been found that the sons had migrated to this village and encroached on forest land and by virtue of their encroachment they had become entitled to the grant of agricultural land as per the RR policy of Gujarat. This package for the sons has been fully implemented and hence there is no breach of promise. The father in this case cannot be considered as an oustee. Land ownership is inherited by a son from the father and there is no law under which a father inherits the encroachment of a son. This is a singular but a very pointed instance on the carelessness with which The Review jumped to conclusions without verification. Simple verification would have avoided them the embarrassment of untrue statements.

## Malu

The Review visited Malu and has commented upon some of the complaints about land, area regarding waterlogging in the previous monsoon. Malu relocation site is one of the biggest sites in Gujarat. 154 families have settled on land which was being cultivated by progressive Patel farmers. The Review's visit does not mention anything about the quality of land allotted to such a large number of families. In fact it has preferred to keep silent on this positive aspect of this site for reasons best known to it. Normally the rehabilitation site would certainly be more relevant if the entire package facilities are examined during the visit but this is ignored and burglary is reported, but such thefts do take place in normal villages also. The Government and the Nigam took immediate steps to provide police protection to this site so that the instance may not be repeated. This was not taken note of in the field visit.

## Krishnapura

The description of the conditions of the tin-sheds has been made in the report. The site is changed to higher level. The lands at Krishnapura were selected by choice and it was almost three years prior to the date of submergence and hence there is no question of force or pressure. In fact a vast majority of oustee population had not shifted their original houses to the new sites as yet on their own.

## Amroli

Amroli resettlement site had some problems and in seven cases land was not found suitable. The Nigam responded to this complaint and six have been provided alternate lands. One plot is leveled and made available. As far as rehabilitation site is concerned, the permanent rehabilitation site is to be located in Baroli where they have started residing now. Therefore the present arrangement was purely temporary. This is another instance where the Independent Review should have verified the facts with the authorities before coming to conclusions.

In the second para of this page the Review has come to the conclusion that the rehabilitation work would be difficult to implement because of the influx of oustees of M.P and Maharashtra. In this context it needs to be reiterated as noted earlier and as known to the Review that the submergence of M.P. is not in the immediate future. The M.P. Govt has started implementing its policy and also started the land acquisition process. Gujarat is willing and would be able to resettle the population that would be willing to resettle in Gujarat. The Mission has ignored the fact which was presented to it by NGOs in Gujarat, that on account of the substantial shift of the work force in Gujarat away from the agricultural sector, land is available, albeit at a price. From 1960 the work force dependent on agriculture in Gujarat has fallen from around 70% to around 55% now.

## 4. ENVIRONMENT: CONTEXT AND COMPLIANCE

In Chapter 10 of the Review on Environment: Context and Compliance, The Independent Review has done a commendable job in listing various resolutions of regulatory and restrictive acts and rules formed by Government of India and State Governments including rules and guidelines for environmental concerns.

The concern of the Sardar Sarovar Project authorities for assessment of environmental impacts was demonstrated by the fact that in 1983, that is long before the loan agreement with the World Bank was signed, and clearances by the Department of Environment and Forest were considered, a preliminary impact assessment study was completed through the M.S. University, Baroda. This study was commissioned by The Narmada Planning Group. The Independent Review comments:

‘The initial environmental evaluations done in the early 1980s, including the 1983 overview ecological studies by the M.S. University of Baroda, presented enough information for the development of proper assessment studies in the upstream area.’(p.274)

On downstream environment also they found that specific issues were there in ‘the preliminary environmental information produced by the M.S. University of Baroda in 1983 after its six month benchmark study.’(p.278) and again ‘we obtained copies of the papers used in its preparation, and these provided more detailed information on many downstream issues.’(p.278) and again ‘The range of research questions necessary for an understanding of the implications of the Sardar Sarovar Projects for water quality and biota in the Narmada River has been clearly identified since the 1983 M.S. University of Baroda Report.’(p.289). On the command area again over five pages (pp 301 -305), The Independent Review lists the detailed work plan prepared by the Narmada Planning Group, on environmental studies and its phasing.

The Independent Review is forced to describe the environmental studies sponsored by the Narmada Planning Group and the M.S. University of Baroda. However, at the onset the Independent Review has decided ‘There appears to have been an institutional numbness at the Bank and in India on environmental matters.’(p.226). The logical inconsistency of the Independent Review is amazing.

The Bank’s credit and loan agreements in 1985 for Sardar Sarovar Project covered certain environmental issues. Based on this, the Government agreed to prepare a work plan by December 1985 dealing with environmental issues including training programme, studies and implementation schedules for fisheries, forests, wildlife and public health. The Sardar Sarovar Project, as far as it relates to Gujarat State, had prepared the Work Plans in February 1986. These work Plans were furnished to the Ministry of Environment and Forest as well as the World Bank and simultaneously were also taken up for implementation, to ensure that the mitigative plans were in place by the time the project was implemented. The project received environmental clearance in June 1987 and clearance under the Forest Conservation Act in Sept. 1987. The investment clearance for the project was received from the Planning Commission in October 1988. As a matter of fact, the clearance given by MOEF stipulated conditions relating to the preparation of Action Plan for compensatory afforestation, catchment area treatment and environment related mitigative measures. Since Work Plans for these were ready, Gujarat was able to launch immediate implementation of mitigative measures.

The Independent Review has quoted from the letter of environmental clearance from the Ministry of Environment and Forest that ‘Field surveys are not yet complete- complete details have been assured to be furnished by 1989.’ As far as Gujarat is concerned, mitigative action plans were prepared and taken up for implementation much before 1989. The Review seems to have ignored the facts. Environmental safeguard measures have been so planned as to complete them before initial impounding of the reservoir. This would fulfill the main thrust of the stipulations laid down by the G.O.I., that these measures are implemented *pari passu* with the engineering components of the projects.

In respect of studies/surveys that are required to be carried out to meet the stipulations laid down in the letters of clearance for Sardar Sarovar Projects in Gujarat, the position is very good. This will be clear from the following table:

Environmental and related studies

A.	Completed prior to project clearances in 1988	22 studies
B.	Undertaken after the clearance of the project and since then completed	11 studies
C.	On going studies (likely to be completed during 1992)	8
D.	Studies proposed to be undertaken	7
	Total Studies	48

Details of the above studies along with dates of completion and schedules for completion etc. are listed subsequently.

The project has been cleared under the Forest Conservation Act as well as from environmental view point. The clearances do not specify any situation where the clearances given would lapse. As prescribed in the scheme of things, for protection of the environment a close watch is maintained on a continuous basis by the Ministry of Environment and Forest through a specially constituted Sub-group of N.C.A. This sub-group meets periodically under the Chairmanship of Secretary, MOEF and corrective measures as may be suggested during the meetings of this sub-group are also implemented by the project authorities. The constitution of the Environmental Sub-group is such that it has representatives also from a few N.G.O. groups and individuals who have concern for environment. This is a method of ensuring people's participation through N.G.O. representation in the implementation and monitoring of the project.

The clearances granted by the Ministry of Environment and Forest under the Forest Conservation Act have not lapsed and the implementation of the programme has been continuing in accordance with the schedule. In view of this, Narmada Control Authority and respective States have not found it necessary to seek any extension of time.

## Upstream Environment

The Independent Review has mentioned that a Work Plan for environmental effects was required to be furnished by 1985 as laid down in the agreement with the Bank. The review has also commented that there is no Work Plan as of today. This observation is incorrect. A Work Plan for the environmental aspects was prepared soon after the agreement with the World Bank and this was finalised and made available to the World Bank and the Ministry of Environment and Forests in February 1986. These Work Plans did not follow an impact assessment in the sense being talked now since the procedures for environmental impact assessment are in a state of development and for example, the Daly Guddines of the World Bank came later but, the Work Plans were prepared by the experts in the respective fields. Their vast experience and the pool of knowledge of respective departments were fully utilised for detailing the required studies and action.

Having realised that the Work Plans had to be prepared quickly with available data, in order to further strengthen the database, a detailed study programme relating to flora and fauna and its carrying capacity, of the submergence and its periphery was initiated in Gujarat. Later this study was extended to cover Shoolpaneshwar sanctuary in the adjoining area. These studies have been undertaken by a multi-disciplinary team of scientists of eminence belonging to the M.S. University, Vadodara.

In Gujarat, compensatory afforestation has been planned and is under implementation for an area of 4650 ha. of non-forest areas in lieu of 4523 ha. of forest land undergoing submergence. In addition, the project authorities have also undertaken upgradation of degraded forests as impact area plantation equal to double the area of submergence i.e. 9300 ha. This was prescribed as compensatory afforestation and is away from the project area. In the context of the slow progress of compensatory afforestation about which the Independent Review has taken a note, it needs to be clarified that in Gujarat, compensatory afforestation would progress to the extent of 70% and catchment area treatment to the extent of 60% towards the end of the 1992 planting season. Similarly, the Impact area plantation in degraded forest area would also cover nearly 60% towards end of 1992 planting season. Substantial work has also been done in carrying out certain improvement works in the Shoolpaneshwar sanctuary area which is adjacent to the project site.

Development of new forest follows a natural process which needs resources, time and efforts. Thus, if the Review suggests that only the forests equivalent in age, quality and abundance to those going under submergence are required to be established as compensatory afforestation then the project would never see the light of the day. The Review has failed to appreciate that efforts were not only trying to compensate resources lost from one part of the State but were trying to create entirely new resources where no such resources exist today. Moreover, the area has a desert ecology and with the biotic pressures, the deserts are extending fast. The creation of green belt around these deserts would help in arresting the spread of desert. Gujarat has long standing experience of carrying out successful afforestation in the dry zone. The areas selected for compensatory afforestation in Kachchh are government waste lands and no produce was ever derived from there. The planting of the said area and raising of forests has in fact resulted into better land use of the waste lands and these lands now produce much needed fodder, fuel and other economic produce. This area has rare birds and animals like the Great Indian Bustard and Chinkara which were about to disappear from the scene and they received protection due to these efforts and are now often seen in the planted areas. The Review members had an opportunity to see this area when Chinkara were found roaming in the new plantations in Kachchh. In the face of these facts, the Review's remarks about selection of lands for compensatory afforestation are not incorrect.

The Indian Council of Forestry Research and Education (Forest Research Institute) Dehradun, a premier Research Institute has been carrying out Research for more than a century. Results of research on biomass production of the main species used in the compensatory afforestation indicate that even if the biomass production of plants is 50% of the recorded, it will be several times more than that of the biomass lost in the submergence. It is incorrect on the part of the Review to expect replication of the original ecosystem lost by way of submergence. It has also misunderstood the value of the land in Kachchh. The Review has also presumed that the land in Kachchh was cheap. This is not true. In fact, the land was Government wasteland lying fallow. The Mission has suggested, that land could have been purchased for compensatory afforestation purposes. Some commercial forestry is already being done in such areas, but, as a policy, forcing tree crops on farm land is not a valid recommendation for sustainable development.

The Review has also not appreciated that besides this, additional compensatory afforestation in double the areas of submergence is being raised in degraded forests in the adjoining and similar ecosystem. These are known as Impact area plantations. The Independent Review has also failed to appreciate the fact that the catchment area treatment measures include improvement of forest cover and extensive afforestation. In Gujarat such areas constitute more than 70% of the catchment area. Proper protection of the catchment area where the tree cover has been lost in the past has given profuse natural regeneration of indigenous species. This is also true for Impact area plantations.

The Review has emphasized the necessity of involvement of local people in the water-shed development programme particularly the catchment area treatment under Sardar Sarovar Project. The Forest Department in Gujarat State has a history of associating people in the development of forests and tree growth in the State. Such a plan has been given high priority in the Narmada Catchment as a whole in the Eighth Plan. The agro-climatic planning exercise has indicated detailed targets in the relevant sub-zone of 3 to 5 Districts each.

In the catchment areas also in the last few years twenty two school nurseries, 602 kisan nurseries were established for distribution of saplings to the local people for planting on their farms, homestead and other common property areas. The formation of village level management committees for participatory management of forest is another milestone. In catchment area treatment of Gujarat itself 45 participatory management committees have started functioning. In order to make the programme successful, Ford Foundation in India, in association with Nehru Foundation for Development in Ahmedabad has carried out training programme of Rapid Rural Appraisal (RRA), Monitoring and extension approaches required for Participatory Forest Management. The Govt. of Gujarat has issued a policy resolution under which village level organisations are entitled to 25% i.e. 1/4th of the forest produce or its revenue.

Other Departments of Government, notably Tribal Development and Rural Development Department have also joined hands with the Forest Department in organising welfare activities for the people who live in the catchment. The programmes that are undertaken are supply of improved agricultural kits, supply of better quality milch animals, agricultural implements, subsidy for construction of wells and oil engines, supply of grafted varieties of fruit trees, poultry farming, rabbit rearing, biogas plants, subsidy for soil conservation measures etc. All these programmes put together constitute an integrated rural development approach.

The underlying idea behind initiating such development activities in the interior forest areas was to improve the production levels of farm lands and forests and to improve the living conditions of the tribal families so as to achieve sustainable development.

With a view to creating awareness for nature conservation, and inculcating love for nature, Gujarat Forest Department has now been annually organising more than 500 nature camps in different parts of the State for school children, college students, farmers, other professionals and senior citizens. Such camps were started two decades ago. Such Nature Education Camps have become extremely popular with all the participants. Special thrust on such camps is being given in the catchment of S.S.P. also.

As a welfare activity, forest department organises large number of medical camps in the interior of the forest areas where help of doctors of different specialization is taken and medicines are distributed free to the patients. Such medical camps also include dental care, camps for giving spectacles to the needy people and special camps for women and children. Thus, in the last few years in the catchment area alone, thirteen medical camps have been organised where 2225 patients have been treated. This activity is gaining ground and becoming popular with the people and it is likely to be extended in years to come.

There are other welfare activities and novel schemes introduced by Forest Deptt. which are unique in the country i.e. scheme of foodgrain banks, scheme of welfare of Kotwalias (basket weavers), scheme for distribution of saplings of fruit trees etc.

The Independent Review's obiter dicta on the Forest Department's efforts on the welfare of people living in forests, do not discuss any of these efforts and no reasoning has been given for the Statement made.

## Upstream Environment

### Sedimentation

1.0 While discussing the effect on upstream environment, the Review Team has made the following points:-

(i) The experience of siltation of reservoirs in India suggests that the actual siltation is always more than that anticipated during the planning stage. This will reduce the useful life of the reservoir.

(ii) The project authorities have applied the figures of observed sedimentation during non-flood periods to the flows available during high floods.

According to the Team, considering the above two factors, the rate of sedimentation in Sardar Sarovar would at least be doubled.

(iii) Thirdly the Team says that in back water studies the effect of delta formation due to deposition of coarse materials at the reservoir tip and consequent rise in back water levels has been totally ignored. If this is taken into consideration it can affect a large population.

(iv) The loss of sediment load within the dam, will cause changes downstream (Dealt with by the Team separately under the subject of Downstream Environment).

2.0 Notwithstanding the fact that, as in other portions of the report, the Team has here also been selective in quoting the references, the response to the points mentioned above would be as under:-

2.1 The Team has quoted extracts of submission of Shri R. Singh Deo, the former Irrigation Minister of MP who has explained the phenomenon of sediment deposition in the reservoirs and pointed out that every year, 2 MAF of live storage capacity is being lost in Indian reservoirs.

This, however, does not say that no new reservoirs should be constructed on this account. It only points out to the necessity of proper watershed management and appropriate consideration of sediment rates for the design and performance analysis of reservoirs. In the case of SSP, both these aspects have been duly taken care of.

The Term cites the example of high sedimentation rate in Ukai. It has to be clarified here that the original Ukai Project had been planned in 1955 with meager sedimentation data. The sedimentation rate then considered was 0.31 acre ft./sq.mile/year (1.49 ha.m. per 100 sq.km/year). This was subsequently revised to 0.89 a.ft./sq.mile/yr.(4.25 ha m/100 sq.km/yr) in 1965 when the project was completely reviewed and its economic viability justified. Unfortunately this figure is never being quoted with the result that the new observed sedimentation rate of 7.16 ha.m/100 sq.km/yr appears to be very large in comparison. In fact the figure is only about 70% higher and not 200% higher as mentioned by the Team.

While opining that the sedimentation rate in SSP would also be double that estimated in the design, the Team has ignored the Report of the GOI's Diwan Committee which had gone into the siltation aspects in Narmada basin. The report had been made available to the Team but its contents were not favorable to the Team's conclusion and hence were not considered. As per the Diwan Committee report the rate of siltation in the Narmada basin can be taken as about 5 ha.m/100 sq.km. per year. This figure is less than the figure of 5.34 adopted by the Sardar Sarovar Project.

The latest findings on silting of reservoirs in India are now available in the form of the 'Compendium on Silting of Reservoirs in India', published by the Central Water Commission in January, 1991. In this Compendium, survey data of sedimentation of 46 important reservoirs in India have been given. As per the finding of these studies mentioned in the conclusion of the narrative report, the situation is not as bad as had been apprehended in certain quarters and sedimentation rates are not alarming.

Another important finding is that the sedimentation rates in reservoirs are usually higher during first 15-20 years of their operation and thereafter they fall off significantly. Some of the reservoirs are serving even after completing their planned life. These findings were also made available to the Review Team but the Team found it inconvenient to mention it in this context.

While considering the sedimentation rate in the Narmada basin, the following relevant factors have also to be kept in view.

- (i) The Narmada basin is in large parts consisting of rocky regions whose erosion would be low.
- (ii) Due to the particular geology of the Narmada basin, the proportion of fine particles in the sediments is much more as compared to the coarse particles. Therefore, during floods most of the sediments would remain in suspension and would either flow past the spillway or get deposited close to the dam. As there are going to be several dams in the basin, a large part of the sediments will get trapped there before entering the Sardar Sarovar.
- (iii) The existing forest cover (34%) in the catchment area and the proposed catchment area treatment would further reduce the rate of siltation. The present studies have not taken into consideration the catchment area treatment.

The Review Team has mentioned that the backwater effect of sedimentation upstream of the dam has been ignored and that this effect would have severe human and environmental impacts.

It has been mentioned earlier that the coarse fraction in the Narmada sediments is relatively less with the result that the sediments will be carried much farther into the reservoir and the shoal formation tendency at the tip will be less. Also such a shoal formation will take a much longer period. Again, it has also to be appreciated that the rate of erosion will be maximum in the initial period of monsoon when the soil is dry and fluffy and has less grass or vegetative cover. But during this period the reservoir would still be in the process of filling up and hence the silt deposition will be closer to the dam. The shoal formation at the tip will, therefore, not be as early as is being apprehended by the Review Team. The resulting incremental back water effect, if any, would also be marginal.

The effect of delta formation is observed to be more pronounced in the case of small and shallow reservoirs. For a deep and long reservoir like the Sardar Sarovar, the delta formation effect will be much less significant.

Again, the backwater effect will very much depend on the actual intensity and volume of the flood and the reservoir stage existing at the time of impingement of such a flood. It is not a normal practice to consider backwater inundation for an all time high flood like the spillway design flood (About 45 lakh cfs in the case of SSP).

As per the Indian Standard, the backwater effect for acquiring property is to be considered for a flood of only fifty year return period. In the case of the SSP the properties will be acquired in all the areas likely to be affected by the

backwaters of a 100 year return period flood (24.5 lakh cusecs). Although the backwater effect with consideration of a shoal of delta formation at the reservoir tip for this flood has not been considered, the backwater levels for this flood without delta effect would in all probability be higher than those for the prescribed 50 year return period flood with delta effect.

Of course the analysis with delta formation will also be done but it is certain that the results would not indicate any change in the scope which has been decided on the basis of higher backwater levels than those prescribed by standards.

The Review Team also argues that sampling with grab samplers as adopted on Narmada is not reliable and the application of these results to extrapolated floods introduces further errors. These, with higher observed siltation rates on existing reservoirs would indicate that for SSP, the siltation rate would be about double that considered in the project.

It has already been explained earlier that scaling up of the siltation rate on the basis of the observed data of the initial performance of existing projects elsewhere is not justified, particularly in the case of the Narmada basin. The scaling up on the grounds of errors in sampling is also not justified. Bottle samplers have been widely used since the beginning of the century in USA and several other advanced countries. Though there are certain limitations of these samplers, there is no proof that in all cases the samplers would indicate lower sediment loads than the actual values. Again while discussing the hydrology the Team has doubted the flood flow figures and felt that they were on much higher side. However, when the same flood volumes are applied for computing sediment volumes, they do not consider that the computed sediment volumes are on the higher side. On the contrary, they say that the sediment volumes will be much higher as the discharge measurements were not reliable. In other words now they would like to say that the discharges considered were on the lower side. The Independent Review obviously does not consider consistency a virtue.

Sedimentation studies for determining the useful life of the Sardar Sarovar reservoir before the silt pocket is filled up have been rigorously carried out as per the international practice. Accordingly, it will take at least 200 years to fill up the silt pocket. The reservoir will continue to function much longer even thereafter. However, on no project in India or in the world, is the resettlement of the people or acquisition of land etc. done on the basis of the backwater effect that might occur after such a long period of 200 to 300 years.

The entire phenomenon of sedimentation is complex and depends on the factors of various stages of land use, rainfall, run-off, topography and geology of the basin, sediment characteristics, its deposition and densification from time to time etc. and accurate assessment of the reservoir geometry at various points of time is almost impossible. Any advance planning, years ahead of such an anticipated unreliable situation particularly in respect of dislocating people is, therefore, normally not done. The rehabilitation of the people and related steps are, therefore, taken on the basis of the backwater effects as computed from the existing reservoir data. Subsequently the reservoir is so operated through advance releases during floods etc. that the new backwater effect, after some sedimentation has taken place, does not go beyond the effect assessed in the initial stages. This will be evident from the fact that on none of the existing projects which have been functioning for the last 30 to 40 years, there have been any complaints from the people on the reservoir fringe that they have been adversely affected because of flood rise due to sedimentation in the reservoir.

In any case, the backwater effect due to silting can be only marginal and can be monitored through proper reservoir operation. The expected backwater curve at a point of time about 50 years after the formation of the Sardar Sarovar had been handed over by the Narmada Control Authority to the Review Team and it cannot be said that the issue has been ignored. The fact is that the shifting of people is never done on that basis from the very beginning of the project.

It may be of interest to point out here that, in Gujarat, the original practice was to acquire all land and property that would be inundated by the design HFL. Subsequently in 1964, on representations from the original land holders that the lands above FRL were not getting inundated for several years, it was decided to acquire land only up to the line midway between the FRL and the HFL and to return the land already acquired above the midway line to the original holders. Even this was subsequently objected to by the people and hence in 1971 it was decided to return all lands acquired above the FRL subject to the condition that they would not claim any compensation should the land be inundated by floods in future. This was agreed to by the land holders. Subsequently in 1977 for all minor projects, and in 1990 for some major projects also, on demand from PAPs, it was decided that lands down to 5 ft

below FRL for minor schemes and down to 6 ft below FRL for the specified major and medium schemes should also be returned to the original land holders as such lands had been hardly getting submerged and the people would rather suffer some damage in case of occasional submergence than lose the ownership of the land permanently. Thus, contrary to the Review Team's fear about adverse impact on the land likely to be submerged by the higher backwaters due to delta formation, the real desire of the people is not to part with land even if it is occasionally inundated and, in many cases, even if it is below the FRL. These ground facts should set at rest any further debate on this point.

## **Down Stream Environment (Including Fisheries)**

In this Chapter, the Mission has concluded that no assessment of down stream environmental impact has been made. It has further concluded that the Sardar Sarovar Dam will have impact on the downstream environment beginning from Stage I and escalating at Stage III. It has expressed the desire that the impact on the river and the development through out the region and the fresh water supply should be assessed. The role of fisheries has to be considered. Priorities need to be stated. Important work needs to be undertaken, properly managed and developed.

The Review feels that the nature and magnitude of some of the impacts that need to be studied and ameliorated can be summarized under four headings geomorphology, salinity, water quality and biota and fisheries.

The Report notes as pointed out earlier the 1983 studies of the M.S University of Baroda and the present studies of the Central Inland Fisheries Research Institute. There is one more study done during 1957-1976 conducted by the Central Inland Fisheries Research Institute, Barrackpore which gives information regarding fish and fisheries of the river Narmada.

## **Lack of Information**

It is not correct to state studies on the environment impact assessment have not been done. Besides the 1983 M.S. University studies the Central Inland Fisheries Research Institute is conducting detailed and systematic studies in this regard. Comprehensive work plans for the upstream of the dam, estuarine section and basin development have been prepared by the Department of Fisheries, Government of Gujarat. It is also not correct to state information on the extent of change in the fishery and number of families likely to be affected etc. are not available. The Department of Fisheries and Central Inland Fisheries Research Institute has taken into consideration that the fishers of Hilsa and Macrobrachium are to be affected totally. Besides having information of the number of families, total fisher population along the river bank falling within Gujarat, the Central Inland Fisheries Research Institute has conducted a detailed socio economic study of the entire river stretch right from its origin to the river mouth in 1991. The study was sponsored by the Narmada Control Authority and it contains complete details of the fisher population, active fisherman, gears, crafts, commercial fishery, earning of fishermen, etc. This was done as per the terms of reference provided by Mr. Blinkhorn of the World Bank. The Review has not taken this report into consideration.

The Review notes that 'some studies' are under way at the Central Inland Fisheries Research Institute, Baroda. Comprehensive studies right from the area of submergence of the dam to the river mouth are being studied systematically by this Institute which includes the preimpoundment conditions of the proposed reservoir, water qualities of the river stretch, seasonal variations in the chemical and physical qualities of water, primary productivity in different space and time, penrthic organisms and their concentrations, plankton, macro vegetation, fish species, biology of commercially important species like Hilsa and Macrobrachium, extent of pollutants and its effect on the river stretch, artificial spawning of Hilsa etc. is done systematically by the said Institute. Preliminary reports on these studies are already available.

## **Basic requirements**

As regards the studies on the biological environment of the down stream, action was initiated by the Department of Fisheries as early as in 1981 when first report of the requirement of the studies were given to the Irrigation Department. The environment studies through the M.S. University was initiated in 1982 and the report was submitted

in 1983. The first work plan of fish and fisheries was submitted in 1983 and later it has been revised two to three times and finally by the World Bank/GOI consultants incorporating environmental aspects of the down stream. These studies have now to be mounted and completed with underscores. The studies of the Central Inland Fisheries Research Institute with its unit at Baroda is also as per the request of the Commissioner of Fisheries, Gujarat in 1986-87 to strengthen the scientific data base.

The studies, as mentioned in the Staff Appraisal Report of the World Bank (1985) is already being undertaken by the Central Inland Fisheries Research Institute. Effects on migration of fish, changes in the quality of water from reduced flows, spawning experiments of Hilsa are regularly studied. The department of fisheries is also contemplating a hatchery for giant fresh water shrimp at Pipodara and breeding work will start shortly on experimental basis. Moreover, the Department of Fisheries has plans to use the proposed major carp hatchery at the dam site to breed Mahaseer also. The seed of this fish will also be released in the reservoir to increase its population.

It is true that the present project studies of CIFRI is to complete in 1993, But the State Government is taking up with the ICAR and the Director CICFRI, Barrackpore to continue this project with a wider scope of studies for a future period of 5 years to get a complete data base as required.

The parameters on water quality and biota are being studied by CICFRI unit at Baroda with a view to monitoring spatiotemporal changes and data was given to the Review during their visit.

## **Fisheries.**

The Independent Review assessment as quoted from the M.S. University study as regards the importance of the river and estuary in commercial fishery is correct. However, the river is not the major source of fresh water fish seed. The State produces enough seed of fresh water fishes artificially in hatcheries. However, a small quantity of prawn juveniles are collected from Narmada for stocking fresh water ponds in the State at present. The State is producing on an average 519 million spawn of fresh water carps annually and do not collect any carp seed from the river Narmada for the last five years. To overcome the effects of Navagam dam on fishing in the Narmada river, the work plan of the Fisheries Department provided for development of a rich fishery in the reservoir to be formed, development of fresh water ponds in the Canal Command area, brackish water fish culture ponds for culture of euryhaline fishes and prawns, etc. These culture fisheries will be based on artificial propagation of the commercial species in hatcheries and not based on seeds available in the river stretch.

Even though the environmental studies on the hydro-biological aspects started as late as 1988, at present sufficient data is available as admitted by the Review's Report (p.291). These will help to assess the environmental impact. As mentioned by the Review, the environmental impacts will appear only after several years.(p.-83). Some may take a decade or more to manifest them selves. Hence, it cannot be said that it is too late to initiate remedial measures on the basis of the available data and studies undergoing. The Government of Gujarat have decided that studies relating to fisheries and downstream environment should now be completed with milestones to be established by October end, 1992.

## **Command Area Environment (Waterlogging & Salinity)**

1. The Independent Review has highlighted the following issues Under Chapter-14 of its report.

- a) Studies on detailed environmental assessment and actions required for protective measures in the command area are not done including those for conjunctive water use, ground water modeling, drainage and soil and land use surveys.
- b) Extensive irrigation planning is based on questionable assumptions: first without considering actual rainfall that will be effective, second irrigation water use efficiency of 60% is unlikely to be achieved. Systems for water supply for both agriculture and non-agricultural uses is based on unrealistic estimates; supply appears to be over estimated and needs under estimated.

The IR attempted to analyse the regions of the command area from the view point of irrigability problems on the basis of rainfall, general soil types, drainability characteristics etc. It has found problems of one type or other with

all regions without exception. Even regions which have predominantly good class II productive soils (regions 2, part of 3, 5, 6 etc.) as per actual soil surveys have been classified only qualitatively such as 'areas with deep black soils', areas having high rainfall, 'areas with low moisture retention capacity', etc. The Mission had perhaps no time to do an in-depth study of soil survey reports available, drainage characteristics as reflected in detailed studies (completed or partly completed) on drainage and ground water modeling as well as data given in basic planning documents. The GOG and the World Bank had arrived at some irrigability problems in parts of regions 4,7 and 11, for which also detailed studies are either completed or in progress to work out proper irrigation strategies. Nothing is being swept under the carpet.

2. The Mission has not appreciated at all the impacts of measures being planned and being actually worked through regarding lining of canal up to 8 ha. turnouts, remote operation of the system, water management plans framed in consultation with World Bank in great details, conjunctive use strategies and how ground water is to be actually integrated through private or agency management. Experience of conjunctive use on Mahi system of Gujarat which is operating since last over a decade is totally ignored. In this project command as much ground water based irrigation is being done at present by farmers as canal irrigation (despite water being freely available). Ameliorative impacts of comprehensive surface drainage measure designed and put to working levels pari passu with canal networks are not considered. In fact the SSP has been planned after learning from mistakes of many past projects, specially with regard to water allowances, methods of distribution of irrigation water, anti-salinity and waterlogging aspects and these are not taken note of though documented. It appears the assessment is done with preconceived ideas.

3. The Mission also makes general statements of water logging and salinisation experiences in India irrespective of the extent of lining of canals, water distribution and management features, water allocations planned vis-a-vis cropping patterns, measures for drainage planned and being worked through ab initio etc. Such references by the Mission are arbitrary and misleading since the basic approach on the SSP has been to avoid the past shortcomings and have an efficient project on the ground.

4. The Mission considers conjunctive use strategy planned as speculative due to technical, social, political and financial issues. It considers this as 'conceptionally laudable' however. It has not examined thoroughly how conjunctive use is to be practiced for SSP, how a ground water monitoring framework has been set up in advance, how farmers are actually using the strategy in Punjab and Haryana as well as under Mahi project in Gujarat and how scarce water is to be distributed to encourage farmers to go in for tube wells, utilise their existing dug wells etc.

5. The drainage and ground water studies completed and those in progress (of which reports were shown or given to the Mission) actually describe how blending of groundwater is to be done with canal water either by pumped conjunctive use or by alternate irrigation practices. These can also be adjusted later depending on local area-wise results of groundwater salinity based on actual operational experience, since the salinisation process does not occur in a year or two. The Mission has failed to appreciate the fact that all these strategies can be put to practice without substantial management difficulties because this is actually being taken care of with groundwater monitoring piezometer network (the system up to Mahi is completed). Water quality measurements would be available for all these piezometers as well as for existing wells in advance and appropriate blending or irrigation strategies with saline groundwater doses followed by appropriate waterings of good canal water can be always planned. Most farmers of India irrigating in problematic command areas know this.

6. In short the conclusion of the Mission that groundwater and salinisation problems will be arising over most regions of the command area are not acceptable, since all appropriate measures as indicated above are not only planned but being worked to operational levels. Cost estimates of the project also provide these and implementation plans are already framed.

## **5. HYDROLOGY AND WATER MANAGEMENT**

1. The Independent Review has criticised the hydrological planning aspect on the following counts:-

- (i) There are discrepancies in the data
- (ii) The anticipated storage development upstream of SSP is not going to come as planned.
- (iii) System analyses have not been carried out to reflect realistic scenarios.

(iv) A comprehensive evaluation of the project is needed including a complete systems analysis of the key features and sequence of development of the facilities upstream of SSP. It should include a reappraisal of the basic assumptions in sizing and operating the SS dam and related facilities.

2. The entire write up on this subject is extremely biased. The team has seen nothing good or noteworthy in the studies. It has a large number of the basic studies, it has picked up from various references and sketches extracts which would favour the conclusions it had probably already drawn in advance. It has twisted the meaning of these aspects in different ways to argue against the SSP.

The award of the Narmada Water Disputes Tribunal which is binding on the Central as well as concerned State Governments has finally and once for all decided the sizes of the storages and the scopes of the projects. It has also prescribed for a period of 45 years from the date of the award, the total quantum of annual utilisation of water and the percentages and procedures of its sharing by various States. It has also laid down various stages of development in different time frames of 10 years, 30 years and 45 years from the date of the award that have to be considered for the planning of these projects. All these covenants relate to the domain of Federal Policy and are binding on the implementing States.

These decisions were arrived at the highest political level on the bases of guiding national policies, developmental objectives and social as well as other relevant considerations. They naturally involve matters of some give and take and have to be assessed from that angle.

The IR had no jurisdiction over these issues and it has absolutely no right to interfere in the matter of social and constitutional policies of the federal polity of India according to which these issues have been decided.

The IR's requirement that optimization studies should be done is wrong to the extent the dam size is covered. This has been decided by the NWDT and even though optimization of hydrology would justify a larger dam, the issue cannot be reopened. Optimization was done to size power installation, distribution systems, lifts etc.

### 3. Discrepancy in the Data:

#### 3.1 IR says that there were discrepancies in stream flow data used by different agencies.

This is not uncommon for a large basin where several data collection and processing agencies are involved for different areas. It may, however, be emphasised here that, as far as the hydrological observations for the Narmada in Gujarat are concerned, utmost care had been taken to ensure as much accuracy as possible. Special organisations with necessary site facilities had been created for the purpose and the measurements were also test-checked from time to time by various technical officers right up to the level of Superintending Engineers. The observations were documented in various data year-books. These data had been critically examined by the various technical experts of the basin States and of the NWDT. The Tribunal's decision was based on the most reasonable reconciliation of the available data. Observational error, if any, in case of very large flood discharges will not materially affect the annual availability figure of 75% dependability or the reservoir operation. For instance the total annual flows of 1959-60 (54.07 MAF), 1961-62 (61.32 MAF), 1970-71 (43.52 MAF), 1973-74 (68.59 MAF) etc. were too large to have any effect on the 75% dependable figure which was about 27 MAF. For similar Reasons the reservoir operation will not be affected as most of the volume of large floods would spill out of the dam. For smaller floods more precise measurements were possible and adopted. Hydrological data measurement, all over the world, has definite limitations which are acceptable for the purpose of planning. The Review accepts that, many of the discrepancies in figures were resolved in CWC.

3.2 The report quotes the personal view of many individuals who say that the errors in streamflow measurement could be 5%, 10% or even 30%. It then goes on to assume that all these errors would ultimately result in less availability of water. Nobody has said that a measurement error will always indicate larger flows since without any systematic bias error can be higher or lower than the 'true' value. In a large data set of the kind being discussed the probability of small compensatory error leading to the overall picture, therefore, more or less getting balanced, is high. The IR has not shown any specific instances where errors up to 30% remain.

The CWC has issued a revised note in May 1992 based on the reconciled flow volumes up to 1990 as checked by the Governments of Madhya Pradesh and Gujarat. The CWC has worked out the 75% dependable flow as 26.60 MAF which is not significantly different from the figure of 27 MAF considered by the NWDT. The CWC has also concluded that there does not exist any trend for lower annual flows. The note also explains as to why an observed

flow series of only 40 years would not be adequate to analyse the highly variable flows of a river like the Narmada. In fact the NWDT had got the flows examined from various experts, hydrologists and the engineers of party States before deciding the quantum. The Review Team's apprehension that the quantum of water will be less than that envisioned by the Tribunal has not been substantiated by any concrete facts and figures. In fact, in 1985 when the World Bank which had at its disposal the large reservoir modeling studies conducted by the Narmada Planning Group, appraised the SSP, it had worked out the water availability afresh after analysing the data and derived at 75% dependable yield of 28.57 MAF as compared to 27 MAF considered by the Tribunal.

There is a glaring inconsistency in the Team's arguments about the flows in relation to the water availability and the assessment of sediment loads. Throughout the chapter on hydrology and water management the Team pleads that the water availability at SSP will be less than that assessed because (i) there were discrepancies in the data (implying that the flows as measured were higher than the actual flows) and (ii) inflows into the Sardar Sarovar during non-monsoon months would be less than the anticipated as regulated releases would not be available due to delay in upstream development. While arguing about the assessed siltation rate, however, (p.273 of the report) they argue that the actual silt load would be higher as the flood discharges to which the observed sample results were applied and extrapolated had errors (implying that the measured discharges were lower and the correct discharges would have been higher). Thus, in the same breath they say that the measured discharges were higher and also lower. The Review has obvious pre-conceived bias against the project.

3.4 The World Bank's review report of India's Irrigation Sector referring to determination of potential irrigable area based on 75% probability level of water availability has also been wrongly quoted in the Team's report. What may be true for projects in other States of India may not be applicable to Gujarat. In Gujarat, for all projects, the reservoir operation studies with 10 daily, fortnightly, monthly and annual data are always carried out to assess the percentage reliability of meeting with the irrigation demands of service areas and final sizing is done accordingly. In the case of SSP also, detailed working tables on the basis of 10-daily and monthly flows were prepared. The Narmada Planning Group (NPG) of the SSNNL through the Indian Institute of Management (IIM) and the ORG, Vadodara, had carried out detailed simulation analysis in the light of the NWDT award. The Team has, therefore, unnecessarily tried to bring in an aspect which has already been taken care of in the SSP. The NPG's studies in detail had been made available to the Review Team but they do not seem to have even looked at the studies. Had they done so, they would not have irresponsibly criticised the aspects of water availability and the operational hydrology.

#### 4.0 Delay in Upstream Development:

4.1 While it is true that there has been some delay in the starting of construction of the NSP, it is surprising to find that the Review Team has already assumed that the NSP is not going to come up at all. This, in spite of the fact that, as noted in the Team's report on p.253, no less a person than the CM of MP emphatically informed them that the work of the NSP had already been awarded on contract. Thus the Team has already been negatively biased in this respect.

#### 5.0 System Analysis for Realistic Scenarios

5.2 The IRR (Independent Review Report) on pages 244 and 245 says that there are no assurances that the NSP will be built as planned and, as a result, the Sardar Sarovar levels, drawdowns and downstream flows would be different and that no assessments have been done to determine the nature of these differences. Again on page 249 the report says that the analysis to assess the amounts of the shortages, their probability and their significance over time has not been done.

This is untrue. As already mentioned in paragraph 3.4, the NPG had realised the importance of such studies and carried out the system analysis for various scenarios of upstream development and the different stages of SSP development. The system analysis had been carried out for simulating the operations not only on the annual and bi-seasonal basis but also for 10-daily and monthly basis. The studies included the different alternatives for power generation, irrigation development, cropping pattern, ground-water withdrawal etc. The main exercises comprised:-

(i) A single reservoir model to represent various stages of water development upstream of Sardar Sarovar to generate corresponding inflows for Sardar Sarovar with variations of power generation and canal capacities as well as irrigation demands at the Sardar Sarovar subject to the directions prescribed by the NWDT,

(ii) A three-reservoir model for the upstream development instead of the single reservoir with variants as above.

(iii) Simulation studies for interaction of the three reservoir model with the fourth reservoir at Sardar Sarovar.

(iv) Hydro-power optimisation studies with single reservoir and 3-reservoir approaches and

(v) Multi reservoir simulation by CEA (Central Electricity Authority) for hydro-power sizing.

alternative canal capacities of 40,000 cfs and 48,000 cfs. The relevant figures of 75% water abstractions for the 40,000 cfs canal are reproduced below:-

Stage 75% reliable water abstraction (MAF) Water.

Virgin 9.94

I 11.35

II 9.00

Studies were also carried out with 10-daily flows and demands for various alternatives of Rabi power generations in addition to full kharif generation coupled with Stage I and Stage II development alternatives. It was seen that with 1200 MW installation working at prescribed load factors in Kharif and 30% Rabi load factor it would be possible to have average annual excess water diversion of 2.44 MAF at Stage I development and 0.59 MAF at stage II development (with 30% Rabi reliability). Further results are given in the following table:-

Single Reservoir Model Results, Installation 1200 MW

Condition	(Rabi load factor)	Power generated (Million units)	Reliability		Excess water reliability(%)	
			Kharif %	Rabi %	1 MAFT	2MAFT
Virgin flow	0.00	26.78	100	100	100	97
	0.10	3236	100	39	97	90
	0.20	3376	100		97	90
	0.30	3447	100	3	97	90
stage -I	0.00	2605	100	97	90	90
	0.10	3237	100	94	83	73
	0.20	4074	100	90	67	67
stage-II	0.00	2056	83	37	33	20
	0.10	2284	80	33	23	17
	0.20	2414	80	30	23	7
	0.30	2436	80	30	23	7

Availability of allocated water for diversion at SSP was, therefore, not at all a problem.

The 3-reservoir model generated following annual inflows for the Sardar Sarovar (after accounting for specified utilisation on various groups of projects in MP).

Stage 75% reliability water inflow at SSP(MAF) Water.

I 15.81

II 9.48

III 8.19

This showed that up to stage II development the inflows up to the allocated share of 9.5 MAF would be available at Sardar Sarovar. Even for Stage III the demand of 9.50 MAF can be met with a small carry over at Sardar Sarovar. (The carry over capacity provided at SSP is 2.81 MAF).

The study of the interaction of the 4th (Sardar Sarovar) reservoir with the 3-reservoir model was carried out with various scenarios which have been described in the relevant NPG reports it is pertinent to make special mention here of the NSP delay scenario where it has been assumed that till the time Stage I development (utilisation of 2.55 MAF) takes place in Gujarat, NSP would not be available for regulating the inflows to SSP. It was seen that in addition to meeting with the irrigation needs of Stage I, extra water diversion of 2.03 MAF would be possible besides average annual river bed power releases of 13.47 MAF. Gujarat's average share water availability in this case however drops by about 20% (although not fully used). This demonstrates the beneficial effect of upstream regulation on irrigation diversions at full development in Gujarat.

Another relevant case analysed was that of only Stage I development (6 MAF) in MP when Stage II (full 9 MAF) development has taken place in Gujarat. It showed that total diversion of 8.267 MAF at 75% reliability would be possible, which would provide an extra diversion of 0.658 MAF after meeting with the full irrigation needs in conjunction with groundwater. Studies were also carried out for 1200 MW power and the standard scenario with the prescribed standard cropping pattern and groundwater use; impact of changes in carry over with 1200 MW installation; changes in cropping pattern; and variation in groundwater use.

The Operation Research Group has carried out, for the NPG, the reservoir simulation and operation studies for the standard development scenario as considered by the NWDT. Obviously, it has not considered the 'no NSP' condition in the sense that Sardar Sarovar Project would have to function forever without any upstream regulating reservoir of the type envisaged by the Tribunal. There was no reason to do so. The Indian Institute of Management study made such an attempt. However, its main study had discussed earlier had envisaged at least one aggregated regulating reservoir upstream of Sardar Sarovar Project. At no time there has been any intention to drop the NSP either at the Government of Madhya Pradesh level or at the Government of India level. The relevant reports of the ORG and the Nigam's publication titled 'Planning for Prosperity' which, inter alia, has discussed these studies, had been supplied to the Review Team. Unfortunately the Team does not seem to have paid any attention to these studies, as these would conclusively refute its biases.

As discussed earlier, the Operation Research Group did carry out analysis for 'NSP delayed' scenario. It considered that storage at NSP would not be available when the Stage I development (utilising 2.55 MAF) of water for irrigation) would have taken place in Gujarat. The studies indicated that the irrigation demand would be fully met for that stage and in addition it would be possible to divert about 2 MAF of surplus spilling water during monsoon through the canal. While the over all power loss during the full year would be about 21.7% as compared to the standard scenario prescribed by the Narmada Water Disputes Tribunal, the power generation during monsoon would in fact be 26.7% higher than that during the corresponding period of the standard scenario. It will be possible to obtain 10-daily and monthly performance and flows also from this model which will be helpful in assessing the corresponding change in impact on the downstream channel. The model can be even suitably modified to incorporate the latest available Information and the suggestions made by the W.B.

What such an analysis would indicate will be the likely periodical reservoir fluctuations, canal withdrawals and the flow releases downstream for the initial few years when the NSP is not available. The Team report apprehends that the resulting environmental impact would be substantial. This cannot be accepted. The environmental changes, are slow and gradual and, therefore, in a short period of five years, the upstream, down stream or command area effects are not likely to be significant. For example, the probability of occurrence of an unusually large flood of a long return period during that delayed span would be extremely low. Similarly the soil erosion in the catchment or sedimentation in the reservoir would be much lower than in the ultimate stage scenario. The resulting ecological impact would also correspondingly be less significant than that for the final stage of development according to which the planning is being done. On the downstream side, the flood scenario during the monsoon from the point of view of fish migration, water quality etc. would in fact be more favourable as compared to 'with NSP' condition.

## 6.0 Other Issues

6.1 In the course of its discourse on hydrology and environment, the Team has touched on certain allied points also which need comments.

6.2 The Team has referred to the various guidelines etc. issued by the Ministry of Irrigation, GOI (1980), the CBI & P and the World Bank's Environmental Assessment Source Book (1992). The first deals with the checklist relating to the Master Plan for the overall development of the river basin. For the Narmada Basin, a broad Master Plan has already been prepared. The CBIP and the World Bank indicate the ideal principles which should be followed in planning projects. All such standards as well as others are examined by the Technical Advisory Committee of the Planning Commission under the Secretary, Water Resources before a project is approved. The World Bank, in its Supplementary Data Volumes Part I, March, 1985, emphasised the importance of 'Sequential Planning'. (Para 4.15 onwards, p.27). It clearly states: -

'Planning for such projects involves major uncertainties and has to proceed on the basis of information available at any given moment. It is for this reason that distinction was made between decisions that have to be made for implementation to start, decisions that may be made immediately, and those that should not be made now and can await the emergence of new and better information as the interlinked planning and implementation processes move along'. The list of strategic decisions before implementation has then been prepared and discussed in the said volume.

6.3 While commenting on the capacity of the canal, the IR has picked up the opinion of Prof. Nathan Buras as it suits its predetermined notions. This early study was followed by considerable later work. This opinion tries to indicate that the canal capacity of 40,000 cfs is excessive. The Team has conveniently ignored the reference to the Bank's letter of June 1983 addressed to the Secretary, Irrigation Department, Government of Gujarat, suggesting that the main canal capacity should be increased from 40,000 cfs to between 44,000 and 50,000 cfs. The question of the canal capacity has also been discussed in paras 4.29 and 4.30 of the Supplementary Data Volume Part I (1985) (Relevant extracts attached at Appendices B & C). While considering the canal capacity factors like availability of groundwater, contribution from enroute rivers and the peak requirement during drought in 70% of the command area have also been duly considered. Further, it is obvious that MP will take a long time to develop full utilisation of its allocated share. Till then, and particularly during floods, SS Dam would be spilling frequently and it would be possible to divert surplus flows through the canal for supplementary storages in the command area and also for leaching of saline lands and recharging of ground water etc. These aspects have also been taken into account while fixing the canal capacity. In fact, from this consideration the NPG had also studied an alternative of 48,000 cfs capacity which ensured better utilisation of surplus flows. The capacity of 40,000 cfs was however ultimately decided from overall techno-economic considerations. Extensive model studies have been undertaken<sup>1</sup> to define 'optimum' capacity for the main canal's head reaches. The models attempted to account for the major factors influencing such decisions as well as for the dynamic nature of the problem. While the studies did not come up with a unique answer, they suggested nevertheless the likely range for the main canal's capacity of about 1,070 to 1,240 m<sup>3</sup>/s at the head depending on assumptions. The uncertainty regarding groundwater pumping capacity was explicitly taken into account by establishing points of 'minimum maximum regret' for adopting a non-optimal solution. In the final analysis, the pumping capacity was allowed to vary between 340 and 450 m<sup>3</sup>/s in areas of usable ground water. On the basis of these results, a design capacity of 1,130 m<sup>3</sup>/s (40,000 cfs) was adopted for the main canal in this headreaches. The Review ignored these detailed studies.

This example shows that, ignoring the realities, the IR has in its report, intentionally created an impression that all is not well in the planning of the SSP, without reverse to facts. (On a number of details not discussed here to economize further clarification is available from economic space Narmada Planning Group, Block 12, Sachivalaya, Gandhinagar 380210, India.)

6.6. The Team report also criticises the method of Bank's economic analysis which adopted the reservoir operation simulation based on the recurrence of the estimated historical flows. The Team says that this will not happen, probably hinting that the analysis is wrong and hence the conclusions and the project decisions are also wrong. This is again an attempt to mislead the laymen into believing that the project planning is faulty.

The Team should have appreciated that this is the only rational way to carry out the reservoir operation analysis. How do we otherwise predict the future flows? It is always more realistic to consider repeat occurrence of a phenomenon that has already occurred rather than to consider some hypothetical scenarios. This is the internationally accepted practice.

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1 Sec Project File: Operations Research Group, Baroda, 'Study on the Main Canal System for the Narmada Irrigation Project in Gujarat vol. 1 (1980) and vol. 2 (1981).

6.7 Another wrong impression that the Team tries to create lies in the statement that 85% of Gujarat's share is going to come from MP's regulated releases all the year round. It is an open fact that nearly 90% of the Narmada flows occur during the four monsoon months. As such, Gujarat's share during these four months would definitely be flowing to SSP, whether it is regulated through construction of the upper storages or flows unregulated. Thus the real part that the upstream regulation will play will relate only to the eight non-monsoon months. Thus only about 57% of the SSP requirement in the ultimate stage would really be flowing in as regulated releases. In fact, there will be unregulated contribution also from the intervening catchment between Maheshwar and SS Dam. The Team further goes on to say that these regulated releases will now not be available as the upstream dams are not being concurrently built and hence the SSP will not perform as planned.

That the small delay in upstream development is not going to materially affect the benefits or the environmental aspects has been already discussed earlier. This will be so as the delay would cover only the initial period of the SSP development. It has also been discussed that even now the regulated releases and regeneration from Bargi, Barna, Tawa and other upstream projects are seen to be around 0.4 to 0.5 MAF per month during the non-monsoon period. Even if we consider the modest net inflow of 0.3 MAF per month for the eight non-monsoon months the availability when NSP is delayed will be as under:-

	MAF
Net irrigation use during monsoon filling period	2.86
Live storage at the end of monsoon	4.43
Net post monsoon inflow 8 x 0.3	2.40
	9.69
Deduct post-monsoon evaporation	0.35
Net available	9.34

(Relevant figures taken from NWDT Report Vol.II, page 94, statement 15.2).

Gujarat's actual share in any particular year will depend on the actual run-off and therefore the reliability of divertible water can be better judged from the simulation studies. Upstream regulation plays a vital role in this context as mentioned in the case of NSP delayed scenario in para 5.2.

It has also been explained earlier that almost all the hydrological data have been reconciled at the level of the CWC. The data have also been examined critically by the basin States. (In their own interest the States would not allow conspicuously or significantly faulty or inconsistent data to be incorporated in the analysis). The procedure for data collection from time to time has also been adopted as per the latest available technique in the country and the CWC itself has been associated with the data collection. Thus the Team's conclusion that due to the non-availability of upstream storages and because of the discrepancies in the data, substantially less quantum of water will be available as compared to that considered by the Tribunal is not well founded. The data are not erroneous and the reduction of regulated quantum due to small delay in upstream storages would only be marginal and that also in the initial few years only. Such a situation does not warrant a complete review of the scope of the project or of the investment decision.

There is no reason as to why the development of projects other than the NSP upstream will not come up as per the basin plan. However for the sake of argument even if we assume that only NSP will be constructed and further also assume that there will be some shortage of water available as a result of this delay in upstream development, the apprehension that the SSP will not perform as planned is not well founded. This is because the systems of irrigated agriculture are inherently resilient and flexible to adjust to small changes of various Inputs. Firstly, the water availability is considered with 75% reliability. This will mean that out of 4 years, 3 years will be such when the quantum of water will be more than that considered for planning. This will tend to compensate the shortage. Further the planning and the economic analysis already take into account that one year out of four would even otherwise fail to meet the irrigation needs.

The years of marginal failures can be converted into successful ones by suitably utilizing the supplementary inputs. For example, the ground water withdrawal can be adjusted to bridge the shortage gap. During years of plenty, the groundwater storage can be replenished. The irrigation planning is done on the basis of certain anticipated contribution of effective rainfall. Now when the river flows are less, the command rainfall could be more than the estimated effective value. Thus the canal discharge required would be less to that extent. Adjustment of cropping pattern, better water management and water conservation measures etc. would also be able to provide the necessary flexibility in net surface water requirements.

In the case of delay in upstream development, if the projects with consumptive water use are delayed and non-consumptive ones come up first, the inflows into Sardar Sarovar would become favourable. Thus the upstream delays are not necessarily adverse to the functioning of the SSP.

A comprehensive look at all these factors would indicate that the IRR's opinion about the SSP not functioning as planned in the face of delayed upstream development is too harsh. The Team's suggestion that the scope of the system analysis should include a reappraisal of the basic assumptions in sizing and operating the SSP is uncalled for. It is ill-founded on lack of study and appreciation of the available data and on a strong anti-SSP bias. It also tried to reopen issues which have already been very carefully considered by very eminent engineers, other experts and jurists and accordingly decided by the Tribunal. Such a suggestion deserves to be condemned and rejected outright.

6.8 The Team's argument that no realistic EIA is possible in the absence of proper system analysis is also not well founded. As the delay in the upstream storage will not be long and as the NPG has already carried out the water balance model studies with virgin flows and various alternatives of upstream storages, the right course for the Team was to assess the situation on the basis of the results of these studies. (In fact the Bank has considered these studies to be on the conservative side as they have considered a short period of only 30 years' observed data for analysis. The Bank estimated that much larger flows would actually be available if a longer series is considered. In the Bank's opinion the considered contribution of 10% by regenerated flows is also very much on the low side. This has been discussed on pages 110 onwards in Bank's supplementary Data Volume, Part I, 1985).

6.9 The Team has suggested a comprehensive reevaluation of the project considering the integration with the Sabarmati and Mahi systems. It has probably been thought that these two rivers will supplement the water resources. The fact is, however, that the Sabarmati flows are not adequate even to feed its own Dharoi command and the committed M & I water supply demands. For Mahi, there is an inter-State agreement with Rajasthan. The Tribunal has also not considered the Mahi command area while allocating Gujarat's share of Narmada waters. Even if Mahi waters are to be redistributed they would certainly be required for drought areas of Mehsana and Banaskantha which are not going to be covered by the Narmada Canals. Towards the end of the chapter the IR states that its recent assessment of hydrology data indicates that if Madhya Pradesh does, in fact, appropriate its allotment of water according to the Tribunal award even then the SSP will not operate as assumed.

As discussed earlier adequacy of water availability has been confirmed by the latest CWC studies. The Nigam has carried out numerous studies to prove that SSP will operate as planned for all the various stages. The IR on the other hand has not shown any of its studies to the Nigam nor discussed them with the officers. We do not know the credentials or expertise of the hydrologist that might have been engaged by the Team. We only know that our data has been examined and scrutinised by some of the best known hydrologists in the country and also by experts engaged by the World Bank from time to time. They have never doubted the availability of adequate quantum of water for the planned performance of the SSP.

## **Appendices [not reproduced]**

Appendix A: Central Water Commission Water Planning Wing, May 1992, A Revised Reconciled Note on Utilisation Annual Flow Volumes in Narmada Basin

Appendix B: Views of the World Bank on the planned design capacity of the Narmada Main Canal

Appendix C: Extracts from WB, SAR, Supplementary Data – Volume Part I – Sizing of Conveyance and Delivery Systems

## 6. DRINKING WATER SUPPLY

The Independent Review state 1983 Report of GWSSB showed use of 0.86 MAF of water to supply 131 urban centres and 4719 villages (total population 32 million), while last year (i.e. in 1991), this was updated as 135 urban centres and 8215 villages (population 40 million) without any increase in total water allocation for water supply.

Narmada M&l water would be available for 11 months a year from an irrigation system designed on 75% dependability considerably less than the standard required for urban water supply. Storage plans are not available. The cost is estimated at several thousand crores of rupees.

The Chairman of the Nigam acknowledged that the number of villages to be served in Saurashtra and Kachchh are statistical figures which include 236 uninhabited villages.

The system of water supply for both agricultural and non-agricultural uses in Gujarat is based on unrealistic estimates, supply appears to be over estimated and needs under estimated.

Benefit issues are raised briefly in WB, SAR 1985 and a loan/agreement item was included requiring Gujarat to establish and maintain municipal, domestic and industrial water charges to cover full operation maintenance and capital costs. These water charges (atongwith irrigation charges) were also listed in appendix of SAR as the second priority for the Narmada Planning Group. (The issue is given cursory treatment).

Drinking water quality issues have not been addressed, nor have waste disposal issues nor have the energy requirements. More specific plans are to be available in a year.

2. A preliminary proposal for tapping the Narmada Canal Water for distribution to various centres, rural as well as urban has been prepared by Gujarat Water Supply and Sewerage Board and was, in fact, given to the World Bank Team. The Independent Review was also fully apprised of the proposal and its stage. For large multi- purpose projects like Sardar Sarovar, only pre-feasibility reports are prepared at this stage of approval or appraisal by any financial body. Detailed designs and plans are always prepared pari-passu with the relevant construction works. The detailed plans and estimates for the distribution network up to Mahi covering 4.6 lakhs hectares have been prepared only last year. This would be in time for the construction work to be completed and irrigation water to be given to the command area as per the predetermined schedule. For water supply schemes, using Narmada water, the canal water itself would be available after 1997 of Saurashtra and Kachchh areas. Gujarat Water Supply and Sewerage Board has, however, taken up preparation of a feasibility report as well as detailed designs and estimates of the distribution network in right earnest. The pre-feasibility report will be ready by the end of July, 1992 and the detailed feasibility report will be prepared within one year

3. In spite of the number of villages covered as well as population to be served going up, there has not been any substantial difference in the water allocation for the chief reason that the requirements of water for both urban and rural areas have been thoroughly reworked on the basis of national norms which are in some respects more conservative. For example, it was earlier conceived to provide 227 Ipcd for five main urban centres, and 140 Ipcd for other urban centres. Considering water availability and dire needs of rural areas, this has been reworked as 140 Ipcd for urban centres with sewerage system and .100 Ipcd for other urban centres. The reworking of assessment is based on the national norms in force. While the norms for urban centres have been revised in the downward direction, (compared to 1983 study), the norms for rural water supply have been taken at a slightly higher level than in 1983 study.

4. The dependability of 75% is for the water from the whole basin system and not for drinking water component as tacitly assumed. In other words, the dependability of 75% applies to total surface basin resources available (28 MAF); of which the share of Gujarat is only 9.0 MAF; of which again the domestic/industrial allocation is 1.06 MAF (0.86 MAF for drinking water). This would get the first priority in allocation not only in terms of Sardar Sarovar Water Policy but also the National Water Policy. A minimum of 95 % reliability for Water supply is to be assured. Thus even in the worst possible scenario, the drinking water needs would be fully met. Any criticism on this ground, thus, is completely misplaced.

5. While preparing the plan of utilisation, the objective is to cover all problem villages spread over the geographical region. While undertaking this exercise, it was found that certain villages especially in districts of Kachchh and Jamnagar were listed in the 1981 census hand-book as uninhabited villages. The fact that these villages are

uninhabited is a historical fact. The reasons why such villages have become uninhabited are not important, but it would be necessary to include such villages in the overall plan as the pipelines would pass near such villages. It is also possible that such villages may become inhabited with the availability of drinking water and the feasibility plans would need to look at each case. For the 236 uninhabited villages, the population as given on the census book and as considered in water supply planning is 'NIL'. As such this issue has no impact on water demand and project planning.

6. Policy aspects of pricing drinking water supply are adequately addressed to by the Govt. of Gujarat. The current policy for water charges is to levy them at the rate of Rs. 6/- per capita per year where water supply is through regional water supply schemes which are maintained by GWSSB. In the light of the discussion held with the World Bank Mission and other senior World Bank officials at New Delhi at the time of the visit of the last Mission (under IDA credit 1280 and 1643), substantial rethinking has been done on the subject. The World Bank has emphasised that the present rates of Rs.6/- per capita per annum need upward revision to about Rs. 14/- to account for inflation. They have also subsequently emphasised that the endeavor should, be to recover the full O&M costs within next two years or so. In the light of emphasis placed by World Bank on cost recovery, the experience of other States has been studied and detailed discussions have been held with senior officers in the Ministry of Rural Development. It has been seen that in case of World Bank Credits finalised for States like Maharashtra in recent past, cost recovery at the rate of Rs.80/- per household per annum has been acceptable by World Bank in the case standpost delivery and Rs.200/- per household per annum in the case of house connections.

Taking into account the cost recovery covenants accepted by World Bank in their water supply mission (for water supply department), it is proposed to consider this in all its details and take a final view as early as possible.

In this connection, it also remains to be borne in mind that the Gujarat Government has shown its commitment to recover water charges from beneficiaries since the year 1983 and is one of the few States in the Country to have such a commitment which covers all regional water supply schemes and not only World Bank aided Schemes. The basic philosophy of the Gujarat Government and of the country for rural water supply to problematic rural areas is that the question of cost recovery of water charges should not be an issue at all. Since minimum needs of rural population have to be fulfilled by the Governments.

The Narmada water which is sweet and having salt content less than 500 ppm would provide a near ideal source for those villages or towns having poor quality water resources.

The energy requirements of the preliminary plan of water distribution will be available after detailed project is worked out. However the requirement of power for the plan would be moderate and would not put any strain on the existing available infrastructure for power supply.

The waste disposal issues have also been taken care of. For urban areas, the normal water supply has been calculated at 140 lpcd with sewerage systems and at a lower level of 100 lpcd for urban centres not having sewerage systems. In addition, many urban towns in the project region already have sewerage systems which may need some augmentation and the local bodies would carry these out as and when required. In so far as rural areas are concerned, the State Government is committed to low cost sanitation programme which is being implemented in several villages of the State under both World Bank as well as bilateral-aided programmes through NGOs. This commitment would remain in future and would stand to be reinforced especially in those villages where current water supply is in the range of 30 lpcd and below. As and when the plan of utilisation is to be implemented, sanitation would be built into the plan with an emphasis to cover villages receiving less than 30 lpcd on higher priority basis with ultimate objective of covering all villages by such programmes. As the past record of Gujarat Government is excellent on this aspect by any standards, there should not be any cause for misgivings by any one.

## **7. PUBLIC HEALTH**

In 1985 the World Bank report identified malaria, schistosomiasis and filaria as the three principal diseases that could jeopardize public health as a result of construction of SSP. A study on schistosomiasis was carried out in 1986 by National Institute of Communicable Diseases (NICD) and was followed by investigating team of World Bank and WHO. It revealed that the disease of schistosomiasis posed no threat in the area of the projects. Malaria was described as 'of a generally low level' over the region. Filaria was 'reported to be close to the dam site'. The

Bank report in 1985 suggested that 'a specific action plan' would be required. Accordingly in consultation with the Narmada Planning Group (NPG) the State Directorate of Health Services prepared a work plan and submitted to the NPG in January 1986.

As mentioned above, the incidence of malaria as per the Bank report of 1985 was 'of generally low level' over the region. It has been at low level throughout the State and this region was not an exception. After consecutive drought years, there had been unprecedented heavy rains in 1988 and 1989 due to which there was a rise in fever and malaria cases as well as Falciparum infection throughout the State. The SSP area also showed increase in malaria cases in general and Falciparum in particular not as an isolated phenomenon but as part of the general trend in the incidence of the disease in almost all the districts of Gujarat as well as rest of the country. The following table shows overall picture of malaria cases since 1985 onwards in the State.

Year	Number B.S. collection	Number Positive	No.P Falciparum	SPR*	SPR*	% of P.F to total +ve
1985	3858300	139207	22097	3.60	0.57	15.8
1986	4419658	153562	35097	3.47	0.79	22.8
1987	5547129	274593	76649	4.95	1.38	27.9
1988	6671412	460683	159286	6.90	2.38	34.5
1989	6292050	598653	185178	9.51	2.94	30.9
1990	6806732	515926	142907	7.57	2.09	27.6
1991	6235933	404735	122839	6.49	1.96	30.3

The information of PHC Lachharas (SSP area) which has been the basis of Mr. Kalra's report is shown in the following table.

#### PHC Lachharas, Dist. Bharuch

Year	Number blood smear collection	No. +ve	No.PF Falciparum	SPR*	SPR*	% of P.F to total +ve
1985	7976	318	43	3.98	0.53	13.52
1986	10484	1467	292	13.99	2.78	19.90
1987	22956	5912	1298	25.75	5.45	21.95
1988	27171	6503	1946	23.93	7.16	29.92
1989	32777	7737	1709	23.60	5.21	22.68
1990	29865	5318	1249	17.80	4.18	23.48
1991	28703	4740	1336	16.51	4.65	28.18

$$*SPR = \frac{\text{Total positive} \times 100}{\text{Total blood slides examined}}$$

$$**SFR = \frac{\text{Total positive for Falciparum} \times 100}{\text{Total blood slides examined}}$$

$$\% \text{ of P.F} = \frac{\text{Total positive for Falciparum} \times 100}{\text{Total positives}}$$

The increase in malaria positives and PF infection has not been the unique feature of only the SSP area but the trend was the same throughout the State, even in Kutch & Banaskantha districts.

Dr. Kalra has compared the figures of 19 villages around the dam site with the rest of the villages of the PHC Lachharas and has shown that the increase in the incidence of malaria in these 19 villages was larger than the rest of the areas of the PHC in the post-construction period. It is true that the incidence in these 19 villages was more. But he has not highlighted the fact that the incidence has come down in 1990 and 1991 throughout the State including the project area and even in the selected villages around dam site. The SPR in the 19 villages in 1990 and 1991 was on the same level as the rest of the PHC. The decline in 1990 as compared to 1989 in API in the selected 19 villages was steep (from 126.7 to 84.8) whereas in the rest of the villages it declined from 61.6 to 41.7. The decline in the incidence shows that factors affecting the overall trend in the whole State also has a bearing on the incidence in the project area.

This is also true of the level of P.F. cases. It has been mentioned in the report of Dr. Kalra that the proportion of P.F. cases is 24% on an average in the project area in the post construction period. But the rise in the level of P.F. was not peculiar only to the project area. We have some PHCs (some of them are in dry area) where the proportion of P.F. cases has crossed 40% in 1988 and 1989.

It is possible that the comparatively large increase in the incidence in the project area in 1987 to 1989 was on account of the influx of labourers who carry the parasite. In this context, the suggestion made by Dr. Kalra for setting up a nucleus preventive health organisation under the Nigam with headquarters at Kevadia deserves to be accepted. This organisation will be able to organise preventive steps on time and guide case management in the hospital at Kevadia.

It is also not true to say that the killer variety of malaria has shown resistance to chloroquine. This is just a hypothetical conclusion by the author of the report. The killer variety means the Falciparum variety of malaria parasite. To establish chloroquine resistance to Falciparum it requires an elaborate study without which a scientist would never derive such a conclusion. The Regional Director, Health & Family Welfare, Government of India, Ahmedabad has carried out a study on chloroquine resistance in Kevadia Colony area under Lachharas PHC of Bharuch district during November 1990. Out of more than 1000 blood smears (B.S.) collected by mass survey there were 70 B.S. having Falciparum infection (PF). Only 13 were showing ring stage of parasite and hence they were proper cases to study resistance by giving chloroquine every day for about a week and simultaneously collecting B.S. every day to detect presence of the parasite. Out of 13 such cases, 12 were sensitive to the chloroquine and only one case showed resistance. Probably this information has been the basis for the report writer to declare general resistance to chloroquine. This is not a scientific observation and amounts to generalisation. Even if we accept such a statement, there are many other anti-malarial drugs available in single form or several combination forms which act fast and are effective. The good old 'quinine' is also found effective against Falciparum infection.

As regards deaths from malaria reported since 1990: during 1990-91 no confirmed death due to malaria in the district of Bharuch has been reported to the State H.Q., although there were some deaths in other districts. During the visit of Dr. Kalra to the hospital at Kevadia Colony in January 1992 while discussing with the Superintendent of the Hospital, information about five deaths due to malaria was given to him by the Superintendent.

Details of all the five cases as per Colony Hospital are as under:-

Sr. No	Name	Age/Resi Sex yrs	B.S.C. Date	B.S.E Date	Result	Date of death
1	Bhav nabn N Tadvi	12 F Boria	27-8-90	27-8-90	PVT	29-8-90
2	Shakuntalaben V.Tadvi	16 F Dekai	4-9-90	4-9-90	PVT	5-9-90
3	Shnkarhai Z Vasava	52M Mankuva	28-12-90	28-12-90	PVT	31-12-90
4	Raman C. Tadvi	35M Kevadia	7-12-91	7-12-91	PER	11-12-90
5	Revaben J. Tadvi	20F Kankuvasna	26-9-91	26-9-91	PVT	27-9-91

The information has not been provided by the Superintendent of the Hospital either to the district health organisation or to the State H.Q. However, looking to the details of the case papers probably the doctor in-charge has not given adequate dose of anti-malaria tablets to all such cases. For instance, Sr.No.2 has been diagnosed as malaria with hepatitis with M.S. Hence, the case was referred to the S.S.G. Hospital, Baroda but expired on the way. It was a case with liver and heart diseases too. Sr.No.3 was also having cirrhosis of liver and not a pure case of malaria. Sr.No.4 was also having hepatitis and renal colic and was referred to S.S.G. Hospital, Baroda on 9-12-91, came back home and died at home on 11 -12-1991. Sr.No.5 was a post-natal case having a history of still birth, anaemia and was in coma stage. Probably the case management was not up to the mark as seen from the case paper record made available. If proper diagnosis with proper management would have been carried out these deaths could have been prevented except those having liver and heart diseases. However, it would not be proper to link such cases to the dam construction.

## 8. COMPLIANCE TO CONDITIONS OF PROJECT CLEARANCE

The IR provides a fairly detailed review about how rapidly the environmental awareness has grown over the last decade. It also mentions the environmental guidelines issued by the GOI and the W.B. However, their major conclusions relating to compliance are unwarranted.

1. One would not expect an experienced Committee to take the position that no development project can be undertaken until all the data and all the studies are completed in advance. This approach totally ignores the case for sequential project planning and implementation.
2. The IR has completely failed to highlight the studies related to environmental issues mounted by NPG/GOG even before the question of environmental clearance came up.
3. Although M.S.University made a quick study on environmental impact, it succeeded in clearly identifying the major areas of concern. This contribution of M.S.U. team has been acknowledged by several knowledgeable international experts on environment. Again, the IR has not thought it proper or necessary to report that the same team has by now completed a very systematic and comprehensive study. A multi disciplinary team of about a dozen professional experts has worked for almost two years to produce an authentic report on the environmental impact on the submergence area.
4. The IR has not considered it necessary to highlight the mathematical modeling and drainage studies completed for phase I area and nearing completion for areas beyond Mahi.
5. When the IR concludes that SSP is a history of non compliance, it has chosen to completely overlook the GOG compliance on various conditions laid down under (a) environment clearance (b) forest clearance and (c) Planning Commission. The IR ought to have noted that most of the conditions have been fulfilled by the GOG.

Status report regarding the compliance of conditions stipulated by the Govt. of India and Planning Commission is tabulated below to economize space. Details are available on request.

A. Compliance of conditions under Environment Clearance:

(i) Rehabilitation Master Plan

As per the requirements of Environment Clearance, a Master Plan is prepared and submitted to Govt. of India. According to this Master Plan, most of the activities will be completed by the end of financial year 1992-93. Though, the process of improvement of quality of life will continue even thereafter. Gujarat is in fact ahead in the rehabilitation programme. By now 3753 out of total 4500 PAPs have been allotted the alternative agricultural lands. Details are given as under:

ACHIEVEMENT UPTO MAY 1992: GUJARAT

Sr. No.	Particulars	Submergence Year July-June				
		Upto 91-92 (Upto May)	During 92-93 (Upto May)	During 93-94 (Upto May)	During 94-95 (Upto May)	Total
1.	Total No. of PAPs who Were to be affected	929	543	1405	1623	4500
2.	Farm land allotment to PAPs	3753	747	-	-	4500

Thus, Gujarat has accelerated implementation of resettlement.

(II) Phased Catchment Area Treatment Scheme:

The Government of Gujarat has already prepared a time bound Work Plan for catchment area treatment. Initially the plan was extended to cover 19386 ha. of forest lands and 5000 ha. of non-forest lands in the catchment. This programme was reviewed after density classification done through the ISRO and the programme has been revised. The revised programme covers the entire catchment comprising 27,204 ha. of forest area and 3025 ha. of non-forest area. The implementation of this programme commenced in the year 1988 and so far an area of 9,298 ha. of forest lands have been covered by various soil conservation and afforestation works. The progress in respect of non-forest lands so far has been 1,045 ha. It is proposed by Govt. of Gujarat to complete

[missing text]

Project Director is organising a workshop to discuss the draft final report sometime during July 1992 and the project report would be finalised thereafter. The Nigam had commissioned a special study on Shoolpaneshwar sanctuary. The project leader has already submitted 3 interim reports and also the draft final report. The Nigam has also constituted a multi-disciplinary expert group to formulate management plan for this sanctuary.

(vii) Carrying capacity of surrounding area

These Surveys are already completed as mentioned under item (v) above.

(vii) Seismicity

The SSNNL/GOG have already carried out the required studies on this aspect. Leading national and international consultants have reviewed the work and the dam design incorporates the recommendations that have emerged from these.

(viii) Health Aspects

The Govt. of Gujarat has prepared a Work Plan on health covering (a) surveillance and control of malaria and (b) surveillance and control of water related diseases. This will be implemented in a phased manner. A special investigation was carried out relating to schistosomiasis. The study was conducted by experts from National Institute of Communicable Diseases, WHO and the World Bank, this was completed in 1986 and possibility of this disease entering the forest area has been ruled out.

As part of EIA studies, the NPG is commissioning a study on the status of health under command area and the other special study on malaria. These studies will be completed by March 1993 and results from these studies would be available well in time for formulating necessary management plan.

B. Compliance of condition stipulated under forest clearance. Condition No.(i) of Forest Clearance:

‘Legal status of the land will remain unchanged.’

Compliance:

This is noted.

Condition No.(ii) of Forest Clearance:

‘The Non-forest areas available for raising compensatory afforestation with complete details viz. Khasara No. village etc will be reported by the State Government before 30-9-1987.’

Compliance:

Villagewise details of land selected and transferred to the Forest Department for compensatory afforestation have been furnished to Deputy inspector General of Forest, Govt. of India by letter no. NPG/FST/101/C/688 dt. 23-4-1986 and further action taken in this regard has been intimated from time to time.

Condition (ii) A of Forest Clearance:

‘The non-forest area selected shall be surveyed, demarcated and declared as reserved/protected forests and placed under the control of State Forest Dept. for raising compensatory afforestation at the cost of the project. Area not found suitable shall be substituted by suitable areas.’

Compliance:

The necessary demarcation and survey work have been completed and the area has been transferred to the State Forest Dept. and also notified under the relevant sections of Indian Forest Act. Compensatory afforestation work is being carried out at the cost of the project. Action is being taken to get lands in substitution for areas not found suitable.

Condition No.(iii) of Forest Clearance:

‘The non-forest areas available for rehabilitation of all the oustees will be reported by the State Governments or a proposal to the satisfaction of Government of India in this regard will be furnished by the State Government before 30-11-1987.’

Compliance:

The action taken in this regard has been reported to Ministry of Environment and Forest, Govt. of India by Govt. of Gujarat vide letter No.RTH/7087/GOI/108/D, dt. 17-2-1988.

Condition No.(iv) of Forest Clearance:

‘No work on the project in forest area will be commenced until and unless condition under (ii) and (iii) above are fulfilled.’

Compliance:

Conditions (ii) and (iii) have been fulfilled.

Condition No. (v) of Forest Clearance:

'Since the project involves violation and also most of the non-forest areas for compensatory afforestation are away from the project area, the State Government will raise compensatory afforestation in double the degraded forest land also - impact areas in addition to the afforestation on equivalent non-forest land. A scheme for this will be submitted by 30-11-1987.'

Compliance:

The Govt. of Gujarat has agreed to upgradation of degraded forest area to the extent of 9300 ha and this has been taken up in 5 districts outside the catchment at a cost of Rs.10.7 crores.

Condition No.(vi) of Forest Clearance:

'A plan for the treatment of the catchment area will be prepared by 31-3- 89 and implemented at the cost of the Project.'

Compliance:

Catchment Treatment Plan for area in Gujarat has been prepared and furnished to Government of India. This now covers the whole catchment in Gujarat. The plan is already under implementation during the last three years. (Please see compliance of condition No.(v) above). The Government of Guj. will bear the cost of catchment treatment for the portion lying within Gujarat State. As regards SSP bearing the cost of catchment treatment in the area lying in Maharashtra and M.P., it may be stated that this aspect is under the consideration of the Government of India, MOWR and the Planning Commission. A National Policy for catchment treatment of all inter State rivers has yet to be evolved and laid down by the Government of India, Government of Gujarat has agreed to abide by such a national policy on sharing of cost. As regards the comments of the Independent Review on the need for watershed development in the area, the Eighth Plan contains a major priority on watershed development included in the Narmada Catchment. The Planning Commission's agro-economic project has given details of targets at the level of sub-zones of 3 to 5 Districts in the catchment area.

Condition No.(vii) of Forest Clearance:

'No forest land will be utilised for rehabilitation of oustees.' Compliance:

No forest land is used for rehabilitation work in Gujarat. The PAPs are being given either Government land or purchased agricultural private land. The land selected by PAPs of MP also belongs to private agriculturists or Government.

Condition No.(viii) of Forest Clearance:

'Tree felling will be permitted in submergence area only up to 4 m below FRL.'

Compliance:

This is noted and action being taken accordingly.

Condition No.(ix) of Forest Clearance :

'Tree Plantation will be done on either side of the canals, roads, foreshore of the reservoir and in the waste land/ vacant lands under the control of the Irrigation Department.'

Compliance:

A plan for afforestation along the canal side has been prepared and taken up for implementation by the SSNNL. This will cover about 18000 ha. About 235 hectare area in the dam vicinity has been taken up for afforestation out of which 200 hectare have been already covered. Tree plantation programme for canal colonies, involving 5 lakh sapling, has been taken up. About 225 hectare of additional area is to be covered through other agencies. Another 200 hectares of ravine land is to be covered under model plantation programme in Gandhinagar District.

Condition No (x) of Forest Clearance:

'Water will be supplied free of cost to the forest department for raising nursery and for irrigation forestry plantation in the command area.'

Compliance:

This condition has been accepted and water will be supplied as and when required.

Condition No (xi) of forest clearance:

'Fuel wood depot should be set up by the project authorities who will also arrange alternate fuel like coal, Kerosene, bio-gas, Ipg, electricity etc. The supply should be free of cost to the other staff as may be determined by the project authorities.'

Compliance:

Government of Gujarat has given careful consideration to this aspect and taken appropriate action. In the contract conditions for principal works necessary provision has been made. Orders have also been issued for supply of fuel wood to the project labour force at the cost of the project.

Condition No (xii) of forest clearance:

'For conservation and management of Wild Life, a committee will be constituted by the State Government by 31-1-89 which will include representative from the Government of India. The Committee will suggest the necessary steps to be taken and draw up a plan which will be implemented at the cost of project.'

Compliance:

A multi disciplinary expert group has been set up for Shoolpaneshwar Sanctuary to prepare appropriate wildlife management plan. The Director of the wildlife of India has been taken on the sub group. It is now decided by the SSNNL to set up three separate expert groups for the remaining sanctions, namely, Nalsarovar, Velavedar and Wild Ass. Two representatives of the Govt. of India have been included in the expert group for Wild Ass sanctuary.

Compliance of condition laid down by Planning Commission.

Condition No (i) of Planning Commission

'(i) The state shall comply with the conditions as laid down in the O.M.No 3-87/80-IA dated 24.6.87 and 8-372/83-Fc dated 8.9.87 issued by the Ministry of Environment and Forest while according the environmental clearance and the approval for diversion of forest lands for this project respectively.'

Compliance:

Necessary details regarding compliance have been furnished above in a and b.

Condition No (ii) of Planning Commission:

'Looking to the size and importance of this project, the State Government will give sufficient priority to this project in the Eight Plan by ensuring adequate funding to match with the construction schedule as indicated in the concurrence of State Planning and F.D. vide Govt. of Gujarat in NDD s letter No. NPP/1084/GOI-4/Pat.V/j dated 3.10.1988. The State will also complete other ongoing project at advance stage in time to ensure that there is no difficulty in funding the peak requirements of Sardar Sarovar Project.'

Compliance

Government of Gujarat would be providing adequate funds for the project to be completed as per 17-22 years time schedule. However, efforts are being made to complete the project in a 10-12 years time frame to bring the intended benefits earlier and also to minimise cost escalation. The Govt. of Gujarat/SSNNL are making efforts to mobilize the required funds from various sources.

Condition No.(iii) of Planning Commission:

‘A programme of drainage and ground water balance studies has been completed for Mahi Narmada-Doab. Such a programme must be completed for the area beyond the Mahi. The Bhal, Saurashtra, Kachchh, Sami, Harij and other areas require this as a precondition. The State should submit to Planning Commission a detailed programme of studies, with milestones of achievements, duly routed through Central Water Commission for monitoring the same by the Planning Commission.’

Compliance:

The NPG/SSNNL have commissioned studies relating to ground water and drainage as required by the Planning Commission. The latest position is indicated in Annexure 1.

Condition No.(iv) of Planning Commission:

‘The State should take suitable advance measures, as may be necessary, to ensure that annual revenue to be accrued from this project covers at least annual operation and maintenance charges including depreciation charges by setting the water rates suitably.’

Compliance:

The NPG/SSNNL had commissioned a study on Water Rates Policy for Sardar Sarovar Project. This study has been divided into three parts as follows:

- i) A survey of literature on water rates policy.
- ii) Case studies of four existing irrigation projects in Gujarat.
- ii) Water Rates policy for SSP

All the three studies noted above have been received. They are being examined for evolving an appropriate Water rates policy for SSP. Recently the Planning Commission has also constituted an expert group on water rates policy under the chairmanship of Dr. Vaidyanathan. The SSNNL/GOG would take into account the recommendation of this expert group also.

Condition No (v) of Planning Commission:

‘The State would set up a Special group of Experts to study the siltation aspect in the main canal under all operating conditions since such siltation, if occurs, is likely to pose a serious problem during the actual operation of this project and may require a huge expenditure for desilting as well as result into serious operational difficulties.’

Compliance:

A Committee headed by Mr. N.G.K. Murthy was constituted to study the problem and recommend remedial measures. The committee report has since been received and is being studied for necessary follow up action. The Planning Commission would be informed about this in due course.

Condition No (vi) of Planning Commission:

‘State should draw up a detailed time schedule for completion within five years the investigation detailed survey, planning and working out the detailed cost estimates for micro level network system for the balance area of the total command of this project.’

Compliance:

The consultancy studies for the work of surveying, Planning, designing and estimating distribution network from distributory down to about 40 ha. chak in village service area and drainage network down stream of chak were awarded to 23 consulting firm for an area of about 4,28,000 ha. in the first phase of Narmada Project i.e. From Narmada to river Mahi. Reports from most of the consultants have been received. The output of consultants has also been reviewed by engaging another independent consultant. Based on this report, work of preparation of draft tender documents is taken up. Further work of micro network consultancy i.e. below 40 ha. chak up to 8/5 ha. sub

chak in phase-I area up to river Mahi has also been entrusted to various consultants. This consultancy work is in progress at present.

The consultancy studies for the work of surveying, block contouring, planning, designing and preparation plans and estimates of distribution network right from distributory down to 8 ha. sub-chak and drainage network have been awarded to 35 consulting firms for an area of about 3.85 lakh ha. of Phase-II area i.e. area between river Mahi to Rupen in January.1991. The stipulated time of completion for this work is December, 1992. The time schedule for completion of the detailed survey, Planning and estimate for micro level network system in Phase-II area is as under:

Micro level network survey for the distributories of Branches taking off from Main Canal Chainage.	Time Schedule
From 144 km to 264 km)	December, 1992
From 264 to 303 km)	December, 1993
Saurashtra Branch Canal	December, 1995
From 303 km to 432.00 km	

Similar work for the remaining area will be taken up in a phased manner.

Condition No (vii) of Planning Commission:

'Past experience of irrigation projects has revealed that main and branch canals are completed up to the end but, in absence of micro-level network to take irrigation water up to out let, corresponding irrigation benefits do not start accruing inspite of huge financial investment made. To avoid this, the State should draw up an implementation schedule segmentwise, for completion of canal network in such a way that a segment of the canal network, taken up from head reaches, is completed in all respects so as to make the irrigation water available, for the designed potential of the segment, up to the outlet in that particular segment.'

Compliance:

The work schedule prepared in consultation with Shri. J.K.Sharma, MIS Consultant, the work of canal system of SSP also planned that it will be possible to irrigate lands in Phase-I area even before the dam is fully constructed. By June, 1995, it is expected that the dam will reach FL 95 M. Then it will be possible to divert water into the main canal. By this date it is planned to complete Main Canal, Branch Canals and distribution system in Phase-I area and create an irrigation potential of about 2.0 lac hectares

The work of Phase-II, that is beyond Mahi, will be taken up in a phased manner.

SARDAR SAROVAR PROJECT- GUJARAT Environment related studies undertaken by GOG

(A) No of studies completed prior to clearance of project i.e. before 1988.

a) Dam and environs	9
b) Command area	13
Total	22

(these include socio-economic benchmark studies relating to each of the 19 villages going under submergence in Gujarat)

List-A attached gives the topic wise details.

(B) No. of studies undertaken and completed after clearance of project

a) Dam and environs	9
b) Command area	7
Total	11

Please see the List-B attached for topic-wise details.

(C) On-going studies

a) Dam and environs	1
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(This is a long term study on continuing basis on monitoring and evaluation of R&R implementation programme)

b) Command area	7
Total	8

Attached list C gives topic-wise details.

(D) Studies on the Ecology and Environment and carrying capacity of the command area 7 (as required by W.B.)

Topic-wise details are given in the attached list D.

LIST-A SARDAR SAROVAR PROJECT- GUJARAT.

Environment related studies under taken.

(A) Completed prior to project clearance in 1988-22 studies.

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Area/Topic	Date of Completion
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Dam and Environs

1. Rehabilitation of submerging villages (19 of Gujarat)	1981-83
2. Ecology and Environment	1983
3. Social Conservation (Dewan Committee-GOI)	1985
4. Health-Schistosomiasis (WB,WHO,NICD,GOG)	1986
5. Work Plan -Forest and Wildlife Catchment Treatment Compensatory Afforestation	1986
6. Work Plan-Health-Malaria and water related disease	1986
7. Work Plan-Fisheries	1986
8. Work-Plan Environment Training	1986
9. Work-Plan Resettlement Training Command Area	1986
10. Ground Water up to Mahi	1987
11. Mathematical Modelling of Ground Water up to Mahi	1982

12. Pre-feasibility drainage up to Mahi	1982
13. Water demand for non-agricultural uses	1982
14. Cropping pattern and water demand	1981
15. Wasteland development in Regions 11 and 12	1984
16. Regionalisation of Command area	1982
17. Socio-economic Bench mark of 62 talukas	1982-85
18. Settlement Pattern in 6 talukas	1982
19. Migration in Gujarat	1984
20. Land Use survey and Mapping -Zone 4A	1983
21. Land Use Survey and Mapping - Zone 4B	1983
22. Afforestation Planning in Phase	1988

#### LIST - B

(B) Undertaken after clearance of project.

#### Completed Studies-11

Area/ Topic	Date of Completion
Dam and Environs	
1. Forest density for catchment Treatment programme (through satellite imageries)	1980
2. Eco-environmental studies of submergence area	1982
3. Management study for Shurpaneswar sanctuary	1982
4. Archaeological aspects 1989(part) (complete) Command Area	1991
5. Techno-economic study for using village tanks as borrow area for canal	1992
6. Growth of Agro processing industries	1990
7. Area development strategies	1992
8. Water Rates policy	1992
9. Irrigation strategy for Bhal area	1992
10. Water Management in SSP	1992
11. Siltation of canals and canal lining	1992

LIST – C

(C) Ongoing studies - 8

Area/Topics	Schedule date for Completion	
Command Area		
1. Ground water Resources beyond Mahi	Long term study	
2. Mathematical Modelling of ground water (Shedhi-Sabarmati)	August - 1992	
3. Mathematical Modelling of ground water (Sabarmati-Banas)	September - 1992	
4. Mathematical Modelling of ground water (Beyond-Banas)	July - 1992	
5. Pre-feasibility drainage beyond Mahi	August - 1992	
6. Research in irrigated Agriculture	Long term study	
7. People Involvement in water management	December - 1992	
8. On Farm Development studies Dam and Environs	December - 1992	
9. Monitoring and Evaluation of R&R programme. continuing basis	Long term study on	

(14 reports received)

LIST - D

(D) Studies on the Anvil-7 (as required by World Bank)

Area/Topic	Schedule date for Completion	
Targets		
	Commence	Complete
Environment and carrying capacity of command area		
1. Flora and fauna (Command area)	July, 1992	
a) Preliminary findings	Dec. 1992	
b) interim report	April, 1993	
c) Final report	July 1994	
2. Sanctuary Management	July, 1992	Dec. 1992
3. Public Health	July, 1992	Dec.1992

4. Fisheries Development	July, 1992	Dec. 1992
5. Command area Development (On farm development)	July, 1992	Dec. 1992
6. Agricultural run-off and water quality scheme of observations and monitoring	July, 1992	July, 1994
7. Archaeological monuments	July, 1992	Dec. 1993

(E) In addition to this a large number of studies have been carried out in-house, particularly in respect of project and command area.

These include strategy for conjunctive use of ground water, canal water distribution strategy, soil-crop-water relationship, water use efficiency, canal operation and management policy, engineering and design related issues etc.

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