

FACTS

AGAINST MYTHS

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INFORMATION BULLETIN

COMMENT

Other Megamyths on the Sardar Sarovar Project

(In response to requests on the economic and financial aspects of the SSP, a second issue is being devoted to the Project.)

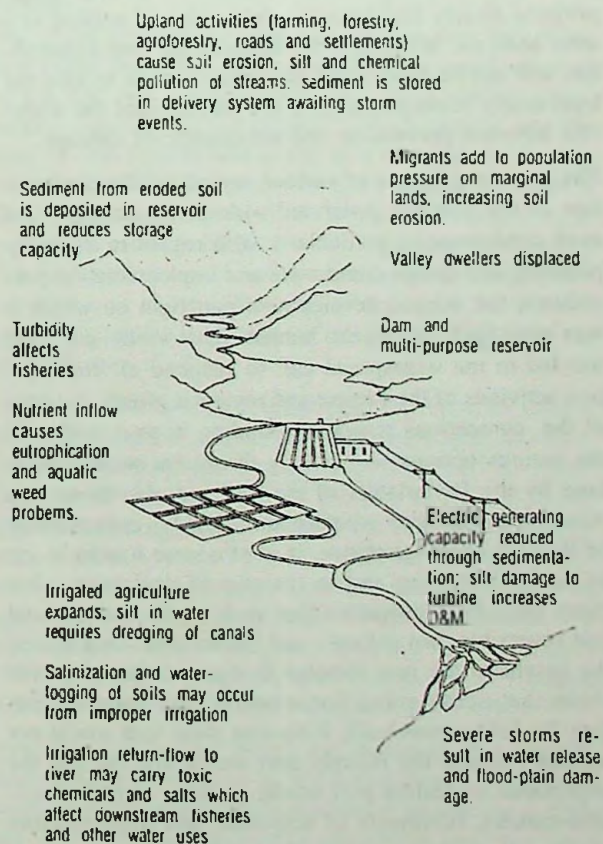
Economic development and environmental consciousness are interrelated goals; the former is crucially dependent on the environment and natural resources for goods and services which directly and indirectly generate socioeconomic benefits. At the same time, however, economic development is often accompanied by significant adverse impacts on the environment. This has led to the misconception that economic development and environmental consciousness are therefore contradictory goals. The reality is that environmental degradation and misuse of natural resources results in losses in the long term, and furthermore, undermines the basic objective of development, viz., the sustainable improvement of especially the welfare of the poor. Adivasis, peasants and others dwelling in these areas are directly dependent on natural resources. Their welfare in both the short and long term is inextricably linked to the productivity of these natural ecosystems. Thus the socioeconomic effects of degraded environments often hit them the hardest. It stands to reason then, that development depends also on the rational use of environmental resources and on minimizing the adverse impact of such development projects as the SSP.

Disenchantment with mega-projects is increasing worldwide, leading to intense debates on their justification, the veracity of their benefits and their claims. The 1991 Congress of the International Commission on Large Dams, for instance, had conceded: "In the future, attention (will) more and more be shifted from the design and construction of new dams, to the restoration of the structural and operational safety of existing dams". The debate has since shifted from whether dams should be big or small, or whether they make good engineering, hydrological and economic sense, to how safe mega dams like the SSP, Tehri, etc., eventually are. Little wonder, therefore, the

Central Water Commission (CWC) has undertaken an Indian Dam Safety Projects (IDSP), shortlisting 52 dams spread over 15 States for a review of their disaster-risks. In the meanwhile, incidentally, mega projects in many parts of the world have been stopped: Franklin Dam in Australia, Nam Chaon in Thailand; Nagmaros in Hungary; Babaquara in Brazil. Katun in Russia and Serre de la Eearre in France, among others¹.

Yet, in the case of the SSP, the pro-dam lobbies continue to manufacture myths and counter-myths. More pertinent, however, the authorities have failed to present any *valid* cost-benefit analysis of the SSP. Had this been done the whole

Impacts of Multi-purpose Dam Projects¹



FACTS against MYTHS

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project today would scarcely make economic sense. What instead has been passed off as 'cost-benefit analysis' is a pattern of falsification. "Gross manipulation and outright jugglery of figures have been resorted to in order to keep the benefit-cost ratio above 1.5 as required by the Planning Commission (i.e. for a project to be approved, it must generate benefits of Rs.1.5 for every rupee spent on it...") (Sardar Sarovar Project: An Economic, Environmental and Human Disaster", NBA (undated) However, the financial costs are only a part of the costs of the SSP. The more relevant costs are the social and environmental disruptions, which are costs that the country will be paying for the "cheap" source of power.. that is:

- 240 villages affected by submergence
- over 40,000 families displaced
- 5 villages evicted for the power centre
- 39,000 ha. submerged, 13,744 being forest land etc.

Till recent years, hydropower was found "cheap" as all these social costs had not been considered. It was cheap at the expense of the Adivasis, the environment, etc.!

The SSP is an object lesson on how conventional analysis has been applied in the construction of this Project — focussing entirely on the dam, the reservoir, the irrigated land and on electricity generation. The benefits are thoroughly evaluated: water storage, flood control, fisheries and irrigation. The costs would be those of construction, operation and maintenance and *some* attention to resettling the displaced. However, current wisdom on the relevance of the natural boundary of the Sardar Sarovar, the length and breadth of the river basin, must be taken into account. But, this is not reflected in the analysis.

The limitations and failures of a number of such mega-projects clearly illustrate the "necessity of natural systems analysis. Without it the chances are that externalities will not be recognised in sufficient time to take the least-costly countermeasures, nor to calculate the trade-offs between prevention and acceptance of damage"

The gross negligence of various aspects of the construction of the SSP has generated widespread criticism and even condemnation particularly with regard to its faulty planning and design component and implementation procedures; the warped development paradigm on which it was envisaged; and to the human rights violations. This has led to the widespread call to suspend all construction activities of the Project and review it afresh in terms of the contentious issues surrounding it; to consider all the various options — not only those that were considered by the formulators of the SSP but also those that were earlier ignored whether consciously, conveniently or through sheer ignorance. It is of course human to err in decision-making and in reviews of decisions— but there must be a guarantee that such errors are minimal and reversible, not gigantic and irreversible. In Calcutta the height of the new Howrah Bridge was based on the claim that ocean-going liners would pass under it. Before the bridge was built, it became clear that would not happen because the Hoogly port would decline and the importance of Haldia port would increase. But the decision-makers, reviewers of decisions and implementors

stuck to their false claim. Today, no liners are passing under the bridge! The result was enormous infructuous expenditure of which the only beneficiaries were the steel/cable structural manufacturers, the erection contractors, etc. Fortunately, there was little human and environmental damage. But, in the case of the Sardar Sarovar Project, it is totally different.

MYTH:

Finance for the SSP is not a problem. It will be available through private investments, by floating public bonds and through financial loans acquired through various fund-raising schemes with a compound interest ranging from 17.5% to 19%, which will all be repaid within seven years.

FACT:

The option of borrowing the necessary funds from the open market is practically impossible. In 1991 the Chairman of the Sardar Sarovar Narmada Nigam Ltd (SSNNL), Mr.C.C.Patel, had observed that in the first 18 months of the Scheme (Kisan Vikas Patra Yojana) itself could garner merely Rs.30 crore as deposits. The NRI bonds had also failed to generate the required amount. Mr.Patel had subsequently admitted that there was a deficit of Rs.2 crore, without taking into consideration the cut in the Eighth Five Year Plan outlay. (SSP: Financial Resources by L.C.Jain, December 20,1994)

Further in its Report of August 1992, the SSNNL had admitted a shortfall of Rs.2350 crores and Gujarat's Eighth Five Year Plan (1992-1997) states : "Given the experience of the recent past and difficulties in raising resources...it is perhaps unrealistic to expect that the SSNNL will be able to raise...Rs.2355 crores during the Eighth Plan. Even raising Rs.277 crores during 1992-93..." is likely to be a problem (op.cit). On the other hand the expected contributions from the affected States have not surfaced; not even being earmarked in their annual Budget for the Project.

In all this, however, the SSP authorities have simply overlooked other essential expenditures that will just have to be incurred if the benefits claimed by them are to accrue eventually. These will naturally raise the project-costs still higher making repayment all the more difficult. At any rate these costs, as studies² on the Project by Vijay Paranjpe shows, include

• Expenditure of M&I water-supply system:	Rs.4025 crore
• Additional cost of rehabilitation of the displaced/dispossessed by canals/distributaries:	Rs.3773 crore
• Compensation to fisherfolk living downstream of reservoir for loss of employment:	Rs. 90 crore
Total financial gap:	Rs. 9888 crore

Apart from these costs there are still other costs, viz. the environmental mitigative³ and other measures for the SSP. For instance, drainage measures, the total costs of which alone are over Rs.3600 crores will simply be ignored as has been done in so many projects all over the country. This would result in severe waterlogging and salinization over most parts of the SSP command area.

No estimates are available for fisheries development, healthcare, weed and vector control measures, downstream impact control measures, sanctuary protection, etc. All these costs add up to over Rs.2000 crores which is only the base cost.(op.cit)

Costs of Ameliorative & Mitigative Environmental Steps.

	Estimated Cost (Rs.crores)
Catchment areas treatment for only the critically erodible, directly draining land	146.43
Compensatory afforestation	72.57
Major drainage works only (excluding over 50 major bridges, countless minor bridges, and the substantial energy costs of pumping out groundwater) for regions 5-13 (CES 1992), and	1600.00
for regions 1-4 (Core Consultants 1982)	200.00

Kalpavriksh, a Delhi environmental group, which closely scrutinised the costs of the SSP arising out of the environmental aspects of SSP, showed that the World Bank estimated the base cost of the SSP as Rs.6264 crores and the total cost at Rs.13,640 crores in 1985." Using similar ratios, *the cost of environmental mitigative and ameliorative measures could rise to well over Rs.4300 crores!*. Obviously, then, any future capital borrowings would therefore lead to higher interest burdens pulling the Project into an inevitable debt trap.

On the repayment of all these borrowings within 7 years, this will also not be possible. First, because given the above financial constraints the entire annual budget of the Gujarat Government is presently less than the total interest amount that will accumulate by the year 2000. The Ex-Chairman of the SSNNL himself, Sanat Mehta, confirmed this:

"Since Gujarat does not have adequate revenue surplus a sizable portion of the cost has to be borne on the capital account from borrowings which leave a liability for the future both by way of interest payment and loan payment... There will be an appreciable interest burden every year".⁴

Moreover as the Gujarat Government has been regularly taking over-drafts from the RBI, it clearly indicates that the internal revenue generation capacity of the State exchequer is unrealisable. Yet, on June 21, 1995 the Gujarat Finance Minister, Suresh Mehta, announced a total outlay of Rs.1500 crores, over 200 % increase over last year's expenditure on the Project of Rs.463 crores!! (Times of India, 26.6.95)

MYTH:

The base-cost escalation is merely marginal/insignificant. Thus the current inflation-rate will not affect the timely completion of the Project.

FACT:

According to Project Officials and others including legislatures of the Gujarat Assembly there *will* be a major base-cost escalation. The estimated costs⁵ for the SSP had first been fixed at Rs.25,000 crores; later Rs.35,000 crores by the World Bank. The World Bank, Gujarat Government, and M/s.C.C.Patel & Associates (CCPA) estimated the costs by assuming an inflation rate of 8.5% till 1980/91 and 6% thereafter. However, the NBA maintains that if ever the Project is completed the costs will be around Rs.44,000 crores. Their analysis was based on the costs of the Project, (remaining to be spent) updated to current price levels. The official cost-estimates of the

Project had taken into account the estimates of the TECS, the World Bank, the GOG and the CCPA estimates. (op.cit)

The costs remaining to be spent till the end of the 1993-94 financial year were arrived at in each case starting with the base costs, deducting the money spent and inflating the remaining costs at the actual inflation rates each year.

INFLATION RATES

Year	82	83	84	85	86	87	88	89	90	91	92	93
Inflation rate %	82	83	84	85	86	87	88	89	90	91	92	93
	4.9	7.5	6.4	4.4	5.8	8.1	7.5	7.4	10.3	13.7	10.0	8.2

The NBA document further shows that in the case of all the above four official costs estimates the costs remaining till the end of the 1993-94 financial year is greater than the base costs. That is, the rise in the Project cost due to inflation is greater than whatever is spent till date as the Table below indicates:

BASE COSTS & THE COSTS LEFT TO BE SPENT (Rupees Crores)

Estimate	Base cost (Base year)	Costs left to be spent at '93-94 end
TECS	4,887 (1981-82)	7,678
World Bank	7,067 (1984-85)	10,142
Gujarat Govt.	8,350 (1986-87)	11,203
CC Patel & Assoc.	8,096 (1986-87)	10,728

N.B. The base costs exclude the price contingency but include the physical contingency. From the official cost estimates, the costs that were to be incurred in the Project, till date, were also calculated and were compared with the costs actually incurred. (See Table below)

COSTS INCURRED COMPARED TO WHAT WAS TO BE SPENT BY 1993-1994 (Rs. Crores)

Estimate	Costs that were to be incurred.(A)	Annual expenditure as % of A
World Bank	7,203	47.68
Gujarat Govt.	5,928	7.94
CC Patel & Ass.	7,274	47.22

The above Table makes it clear that the Project is lagging behind the official schedule, financially, by over 50%. (op.cit) The implication of such delays on the economic viability of the Project is much greater. CC Patel & Associates also maintain that the rescheduled project is already about 50% behind even the new schedule proposed by it, and the Project by these calculations has therefore already become economically unviable. Similarly the WB Staff Appraisal Report of 1985 based on its risk analysis, concluded that the present value of the Project's benefits have become zero.

MYTH:

The cost of impounding per unit volume of water stored reduces with height. That is, the cost reduction per unit of water stored is a linear function of increase in the volume of water stored at one reservoir.

FACT:

The engineers are convinced that the advantages of scale

are endless! However, the cost per unit reduces with increase in scale only up to an optimal point and that it begins to rise quite significantly when the scale of impounding increases beyond the optimal point. Obviously, the engineers have been using the economic law on costs only partially and out of context. The theory of costs, however, maintains that the increase in the scale of production/output (in this case to be read as scale of impounding), the cost per unit falls only up to a limit, and beyond this optimal limit the cost per unit starts rising at an increasing rate. This has been clearly demonstrated by costs of mega-dams having increased uncontrollably. Related to this is the issue of height of the SSP. NWDT had ruled that the FRL (Full Reservoir Level, or, the height of the dam) of 436 ft. was sufficient to deliver the irrigation benefits to Gujarat and Rajasthan but the dam FRL was increased by 19 ft. from 436 to 455 ft. for supposedly increasing the power benefits (op.cit.). This extra height implies a 455 ft. embankment that would lead to the submergence of 240 villages, 40,000 families, and 39,000 hectares (of which 13,744 hectares is prime forests). Moreover, the submergence of 5 villages in Gujarat, the so-called Rock Fill Dyke villages, was necessary for the CHPH to be able to act as a peaking station. While the power benefits are to go largely to M.P., the extra height increased the gross areas submerged in M.P. by about 35%, the cultivated areas by 50% and the population affected by about 70%! Yet, the power to be generated would rise only marginally. As pointed out by the NWDT, "unless the FRL of Sardar Sarovar is fixed at 445.3 there would be a loss of 230 to 350 million units per year...", less than 10% of the firm power generation.

Evidently, this height increase was not aimed to provide any increase in the peaking power, the main benefit of the SSP hydro. It could be availed of at the same height. It was aimed merely to increase the generation.

MYTH:

The cost of power generation for the Project is the same for other conventional generation schemes and, comparatively, less costly.

FACT:

A.K.Reddy of the International Energy Initiative and Girish Sant, an energy analyst, maintain that the costs⁶ so far for power generation of the SSP is far higher than even the conventional centralised generation alternatives.

The figures show that *only coal-based thermal power*

would be more expensive than the SSP which is the next most expensive choice (cf: diagram)

The cost supply curve, (above figure), shows the cost and the potential of eight generation and savings options, ordering them by increasing life-cycle costs (Rs/KW). For comparison, the cost of potential of the SSP is also marked to provide the yardstick for comparison. The area under the curve yields the total life cycle cost for each option. What this cost-supply curve reveals is that:

- the capacity claimed by SSP can be achieved at much lower cost with a combination of a few of the alternatives. and specifically at about 49 % of the cost with a combination of efficiency improvements in lighting and irrigation pumpsets and other PSTOR schemes;
- with the same capital outlay as that estimated for the SSP, a least-cost mix of alternatives can yield 65 % more electrical benefits than the SSP;
- an enormous realistic potential of over 4,000 MW — roughly 2.7 times what has been claimed to be the output of the SSP — is available by utilising energy options cheaper than the SSP;
- other options also lead to much smaller social and environmental impacts than the SSP (Unlike other hydro-electric power projects, the SSP cannot be considered a renewal source because conventional generation will come down to negligible levels as the irrigation systems develop. and pumped storage will increase with the pumping being done with electricity generated to a considerable extent from the combustion of fossil fuels.

Thus, the economics of alternative energy options as also its achievable power potential are notably superior to that of the SSP. As against these alternatives, the SSP does not provide greater environmental and social compatibility. Significantly, the power component is thus being acknowledged to be both uneconomical and shortlived! By 2004, according to present calculations, the two power generating stations will only be producing a miserly 110 MW. In fact, the RPBH will be producing no power at all within 15 years of commencement.

MYTH:

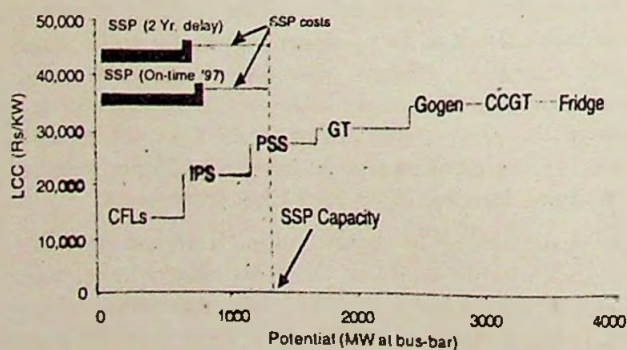
Along with other benefits the SSP will also provide additional benefit of 1450 MW of power for the whole Western region.

FACT:

Initially, when the Eight Five Year Plan was being drawn, the Central Electricity Authority (CEA) recommended 48,000 MW capacity but due to heavy resource constraints it was drastically cut down to 30,538 MW. According to Dharmadhikari⁷ and others even this will however be difficult to meet.

The power plant of the SSP will operate in two distinct phases. In Phase One, corresponding to Stage I and II of the irrigation development in the Valley, the power serves as a Generating Station actually producing electricity. In the second phase, corresponding to Stage III in irrigation, the power station will generate negligible electricity (as per the GOG, zero in the Riverbed Power House (RBPH). In this phase, it will act primarily as *peaking*

Life-cycle Cost versus Potential of Various Options for Western Grid



facility by providing pumped storage. In between these Stages there will be a transition phase, where the generation component will decline and the SSP will increasingly act as a pumped storage. SSP will not generate peaking power but only provide a peaking facility or pumped storage (op.cit) to help match the peak loads.

The pumped storage function of the SSP is considered to be the most attractive part of the SSP Hydro with the task of i) generating electricity and ii) pumped storage. In the former — the 1450 MW mentioned is only the installed capacity — the actual energy generated on an average non-stop basis is much less. The repeatedly bandied figure of "1450 MW of electricity" often conveys a benefit out of proportion (op.cit)

"There are two places in the SSP where power will be generated — the River Bed Power House (RBPH) and the Canal Head Power House (CHPH). The installed capacity of these is 1200 MW and 250 MW respectively. — a total of 1450 MW. However, at the RBPH and CHPH, the turbines will operate for only a part of the year. Also as the abstractions for the irrigation increase on development of irrigation, the amount of water diverted for power generation will decrease. Thus, initially itself, the average continuous power at RBPH will be 415 MW, decreasing over the years to zero; and the CHPH will have an average continuous generation of 24 MW gradually increasing to 50 MW. There would also be some seasonal generation averaging 1621 MU in the initial stages, going down to 865 MU in the final stages. Thus, on an average, the power generation at SSP will decrease from 439 MW to only 50 MW over the years!

The power-generation at SSP will also be affected by:

- the total yield of the river itself which has been over estimated by about 17%. While the NWDTA has taken the yield to be 28 Million Acre Feet (MAF), more accurate figures show that the yield to be only 23 MAF;

- substantial part of the power benefits depend upon the regulated release of water from the upstream Narmada Sagar. This release itself is dependent on ample rainfall. If the NSP is not built, the power benefits will substantially suffer.

● NWDT itself in 1979 held that "without regulated releases from the Narmada Sagar, Sardar Sarovar (Full Reservoir Level) FRL + 455 will not be able to utilise its allotted share of water ... there would be a loss of 17.8% in irrigation and power benefits at Sardar Sarovar..." The Tribunal did not give a breakup of the loss of benefits in power and irrigation separately but gave a combined figure, and ruled that SSP would therefore have to pay a part of the NSP cost.

In its appraisal of the Project, prior to sanctioning the credit, the World Bank had calculated that without the SSP, the power benefits would decrease by 25%. Moreover, the loss in the firm power would be substantially higher than this decrease of 25% in the total power generation (op.cit.). In fact, the study by the Narmada Planning Group, Government of Gujarat, based upon the "Fourth Reservoir Model", puts this figure as high as 28%. Quoting this study, the GOG publication, "Planning for Prosperity" states, "Delay in coming up of the Narmada Sagar

in M.P. when Gujarat is at Stage 1 produces a reduction of 28% in power releases at the SSP which can be considered as very significant". It also points out that it is not only the non-construction of NSP, that will lead to the loss in power benefits, but also to a delay, as the power benefits from the SSP are significant only in the Stage 1. Even if the NSP is built, the power benefits may still suffer (op.cit)

A detailed study of the hydrology of the river by the Morse team had concluded: "...the prospects of the construction of the NSP does not obviate our concerns about the performance...of the Sardar Sarovar...(and) that if Madhya Pradesh does, in affect appropriate its allotment of water according to the Tribunal Award, the Sardar Sarovar will still not operate as assumed". Thus the hydrology, and the (lack of) upstream regulation will result in substantial decrease in the benefits on account of power generation. While the combined effect of these two (lower yield and non-construction of NSP) has not been quantified, it is bound to be substantial. Moreover, this impact is the maximum in the earlier stages, when the generation benefits are expected to be the maximum. (op.cit)

Pertinently, the SSP itself will consume large quantities of power, mainly in Gujarat and hence, the net power benefit from the Project, will be marginal, even if it did deliver as promised.

MYTH:

The SSP is a reservoir of cheap, clean and non-polluting energy, the least-cost solution to the Western Region Expansion Programme, benefiting the concerned States immensely.

FACT:

The claim of being the least-cost solution was backed by the World Bank. The present worth of the economic cost of the SSP was compared with the "most realistic alternative plan without the project". The "practical alternative" to the Project was given as a minemouth thermal plant in the Vindhyachal region and a load centre thermal facility located near the SSP. The alternative plant capacity was taken to be 2000 MW. Thus, not surprisingly, the SSP turned out to be the least-cost solution when compared as above. The very selection of the thermal plant as a "realistic alternative" loaded the final outcome in the favour of SSP.

However, even in these comparisons, the financial costs of the SSP have been seriously underestimated. Dharmadhikary (op.cit) points out that the NCA in 1990 placed the cost of hydropower from the SSP at Rs.11,750 per KW installed as capital costs, while the cost of energy were worked out as 80 paise per unit in the initial stages of the operation. Clearly, therefore these were serious underestimates. The total outlay on the hydropower section of the project was put at Rs.2700 crores in early 1993. This itself works out to be Rs.18,620 per installed KW; in an increase of 58.5% in just three years.

Similarly, the cost of energy too is clearly an underestimate with only the cost in the initial stages being mentioned, where the cost will be the least as generation is highest. If the decrease in energy generation over the years

is taken into account the cost of generation will work out to be much higher with the increased cost.

Independent estimates (op.cit) worked out as late as September '93 indicate that the cost of the energy from SSP would be Rs.1.12 per KWH i.e. 1.12 per unit, and a delay of even two years would push up this to Rs.1.41 per unit (at Rs.1993 prices)

MYTH:

All is well with the Sardar Sarovar Project and the portents are good.

FACT:

How well everything is with the SSP and how it is progressing can be gauged by these events in the recent past:

- In September '94 the stilling basins in Bays, 1,2,3, and 4 were damaged by monsoon floods at the base of the dam, throwing up 1.3 lakh cu. metres of cement; The damage also revealed the problems RBPH was facing. It had already been weakened by water seepage during the floods. The protective wall around the tail-race channel of the powerhouse broke, filling it with 20 metres of water. As a result, machinery and equipment worth Rs.3 crores was submerged;
- On December 14, a report by a 6-member all-party team of MLAs from M.P. the Sardar Sarovar Displaced Inquiry Committee, stated that only 2 % of 33,014 families in the submergence area, had been rehabilitated;
- the rehabilitation sites were water logged, amenity-less, barren, waste and fallow-land;
- 75 % of the land allocated to the dispossessed was of appalling standard. "Even after three years, there are still tin sheds on the rehabilitation sites, a approach roads and water supply have been provided and Rs.10,000 for making house foundation (sic) have not been given"
- the Jayant Patil Committee reported that the 8,214 villages and 135 urban centres that would be provided with drinking water are still to be named;
- the drinking water project was not properly defined and its funding not spelt out. Above all, it pointed out that there would be no water available for the next 10-12 years;

- it called for a census of all PAPs (Project-Affected People) revealing the lack of accurate data on displacement. Like water availability will be substantially lower than the original 28 MAF. This has cast doubt that ultimately only 23 MAF will be available. If this becomes true not only will less area be irrigated and less power produced but the entire project will have to scaled down

- the academy for Mountain Environics (AME), in a geo-scientific survey of April 1995 found that the area around SSP has a fractured zone similar to that associated with the Latur earthquake and therefore the Project is no longer considered safe. The AME has therefore suggested freezing construction at its existing height.

The above however is merely tip of the iceberg. There are already a number of other reports passing strictures on the Sardar Sarovar Project shattering the Government myth that all is well with the Project.

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