

Lead Piece



Solar Power Boom

After many seemingly false starts, it seems the solar power is edging towards boom. A confluence of high oil prices, concerns about global warming dictating need to move towards low carbon economy and technological advances suggest that we may be moving towards an era of solar power. A 354 MW solar thermal power plant operating in California for almost two decades, new solar thermal plants of total capacity of upto 2000 MW in the pipeline to supply power at an unbelievable competitive cost of 10.4 cents per kwh, thus competing with the mainstream sources and technological advances making it possible to increase the efficiency of photovoltaic cells to upto 50% or potentially even higher are some of the indications of this boom. India can benefit a lot from these developments if the govt were to come out with right policies & incentives including appropriate tariff.

“Our analysis convinces us that a massive switch to solar power is the logical answer” wrote an article in the Scientific American on Dec 16, 2007. “A confluence of political will, economic pressure (oil prices) and technological advances suggests that we are on the brink of an era of solar power”, wrote New Scientist in an article in Dec 2007. The Political will has clearly come under pressure of global warming impacts. This has been helped by mushrooming investment & steady advances in their efficiency.

Global Scene According to the REN21 Renewables Global Status Report 2007, Grid connected solar PV continues to grow at 50-60% annually and now accounts for 8000 MW. Solar hot water systems provide water to over 50 million households worldwide. Global demand for solar technology was \$ 2 billion 2003, \$ 15 billion 2006 and likely to reach \$ 100 billion in 2015.

Solar Thermal In 1988, nine parabolic-trough energy farms were built in the Nevada desert. Together covering just over 1 square kilometer, they produced 354 MW electricity. An Israeli company, Luz Corp., built the power stations in the Mojave Desert. Now, with energy prices on the rise, plans are being drawn up to revive the technology. The parabolic troughs work well. But the mirrors, among other things, have to be very precise, making them difficult and expensive to build. The original series of plants in the Mojave managed to bring the cost down from 28 cents per kwh to 16 cents, while the newer ones are a penny or two cheaper. In Dec 2005 the first trough system built in the US since 1988 was switched on in Seguro, Arizona. It is capable of generating 1 MW power. Meanwhile, Spain's Acciona was building an updated 64-MW project costing USD 226 million in the Nevada desert. In July 2007, Israel-based Solel Solar Systems announced it was building a large solar

park in California after PG&E agreed to buy all 553 MW of the park's capacity. Brightsource, a solar-thermal startup based in Oakland, Calif., has filed an application in Oct 2007 to build a 400 MW power station in the Mojave Desert and also is negotiating with PG&E.

One of the new methods uses dish-shaped mirrors around 10 m in diameter to focus solar energy onto an engine, which contains a gas that expands under heating and so drives a generator. At 24 per cent, its efficiency beats all other solar concentrator systems. In 2005, the California Public Utilities Commission, the state body responsible for regulating private power stations, gave the go-ahead for the world's biggest solar dish concentrator farm to be built in the Mojave desert, north-east of Los Angeles. When completed in 2010, its 20,000- dish array will generate 500 MW.

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Bihar Floods of 2007: Some lessons for Everyone

There is good news from the relief front from Bihar this year and that is definitely a healthy sign for future. It is there because for many years in the past, the relief scene used to be chaotic and 2004 flood relief scandal was the logical end of the goings on in relief distribution. A slight change for the better is greeted with cheers from all quarters. Providing relief is a state subject and the Central Govt helps the states in some ways in managing relief to the flood victims. Twelfth Finance Commission has revised the standards set for relief under Calamity Relief Fund and recommended it to be effective from June 2007.

Damages Govt of Bihar (GoB) submitted a memorandum for assistance to the Central Govt on 28 August 2007. By that time 9939 villages in 225 blocks of 20 districts with a population of 20.4 million were hit by floods. GoB anticipated that by the time the floods are over, some 25 million people would be hit. Some 515 persons were killed in the floods (projected 600), 512,000 houses were destroyed (projected 6 lakhs) and standing crops over 16.4 lakh hectares was submerged till then. Besides, there was an extensive damage to National and State Highways, breaches in embankments, damage to health infrastructure, industries, fisheries, energy and cattle. GoB had put its losses at Rs 8000 Crores and requested the Government of India (GoI) for immediate help. Of the requested amount, over half the demand (Rs 4,130 Crores) was from the Disaster Management Department (DMD) of the state to cover the costs of food assistance (one quintal wheat/ rice for estimated 6 lakh families), house rebuilding grant, distribution of polythene sheets, emergency cooked food and deployment of helicopters etc.

By now the floods have hit 12,610 villages spread over 264 blocks in 22 districts affecting a population of 24.8 million. Standing crops over 16.63 lakh hectares has been hit by flood that has affected 16.13 lakh animals killing 1006 of them. Over 736,857 houses have been destroyed and 960 persons have lost their lives in this year's flood according to the information received so far. Obviously, the damage is much more than what was anticipated on the 28th August. The state was supposedly best prepared to meet the disaster this year and ended up in distributing maximum amount of relief material. What sort of disaster preparedness is this?

Relief Provisions Before analyzing the quantum of relief that has gone into the flood hit area of Bihar this year, let us glance through the provisions of CRF.

⇒ The general recommendations suggest that death due to floods would mean a compensation of Rs. one

lakh to the next of kin subject to certification by a competent authority.

⇒ Compensation packages for fully damaged pucca house- Rs 25,000/-,

⇒ Fully damaged kachcha house – Rs. 10,000/-,

⇒ Severely damaged pucca house Rs 5,000/-,

⇒ Severely damaged Kachcha house – Rs 2,500/-,

⇒ Partially damaged pucca and kachcha house – Rs 1,500/-, Hut- Rs 2,000/-

⇒ Compensation of Rs 35,000/- to any person injuring his eyes / limbs with damage between 40 to 75 %

⇒ Beyond that the compensation would be Rs 50,000/-

⇒ Compensation for grievous Injury with hospitalization up to one week - Rs 2,500/-

⇒ For hospitalization of over a week, Rs. 7,500/-

⇒ Lost clothing and utensils Rs 1,000/- per family.

⇒ Immediate sustenance – Rs. 20/- per adult per day and Rs. 15/ per child per day for 15 days. This can be extended to 30 days in case of extreme situation. Rs 2/- per day per infant for additional nutrition as per ICDS norms for a maximum period of 30 days.

⇒ De-silting of agricultural land with minimum sand casting depth of 3 inches - Rs. 6,000/- per ha for small & marginal farmers. Renovation of Fish Farm – Rs 6,000/-

⇒ Land lost due to changing course of rivers Rs. 15,000/- per ha subject to establishing the ownership.

An agricultural input subsidy of Rs. 2,000/- for small and marginal farmers in rain fed areas and Rs. 4,000/- per ha in assured irrigation areas. Rs. 6,000/- agriculture input subsidy for perennial crop. These benefits are also available to other farmers with a ceiling of one ha.

Subsidy for cattle lost

⇒ Milch Cattle like buffalo, cow and camel Rs 10,000/-

⇒ Draught Animal like Camel/ horse/ bullock Rs 10 000/

⇒ Calf/ Donkey and Pony – Rs. 5,000/- and

⇒ Sheep / Goats Rs. 1,000/-, Birds – Rs 30/ per bird.

Fishermen loosing their traditional craft, Partly – Rs 2,500/- +net; Fully Rs 7,500/- +Net.

Besides, there are various other provisions that a flood victim is entitled to.

Similar assistance is available for other artisans like weavers etc subject to certification from the competent authority.

Flood Relief in Bihar Let us glance through what has been done on the relief front in Bihar till date. 425039 Tons foodgrains have been distributed so far while the flood hit families would be around 50 lakhs. If the floods

hit the people in the month of July and it was expected from the Government that it would feed the flood victims for about a month, it is obvious that the grains did not reach all and also it never reached them in time. Many families must have been forced to arrange food for themselves. Despite this, one must appreciate the effort of the Government because reaching grains to so many people was, probably, never done in the past. It has asked Rs. 945 Crores from the Center under this head. GoB had further asked the Center a sum of Rs 60 Crore for ex-gratia payment to those families who had lost their family members (projected 600) in this flood. GoB has paid additional Rs 50,000/- to every such family from the Chief Minister's Relief Fund which is a welcome deviation from the past.

The Government suggests that it has distributed 3,77,707 numbers of polythene sheets to the flood victims till date and it had written to the Center for providing this material to 40 % of the flood hit families, which according to its own submission should have been around 2 million. Assuming that all the NGOs put together might have distributed another 75,000 sheets (it is an ambitious estimate), those given polythene sheets may not number more than 4.5 lakhs. This number is less than 10 per cent of the affected families and it implies that nearly 1.5 million families must have braved floods under open sky amidst heavy rains that continued almost till the middle of September.

For emergency expenses (Rs 20/- per adult and Rs 15/- per child) that a person is entitled for, GoB has so far paid Rs. 84.05 Crores against a demand of Rs. 1105 Crores made to the Center. This is just about 8 per cent of the requirement. Further, the GoB had asked for resources for rebuilding 4.8 lakh houses (assuming 80 per cent houses of the six lakh damaged houses are kachcha and belong to poor) but the number of damaged houses has gone up from an estimated number of 6 lakhs to over 7.3 lakhs.

GoB had proposed that the sum of Rs 10,000/- that was to be given to each family under this head be coupled with the provision of Rs 25,000/- available under Indira Awas Yojana (IAY) and rebuild better houses for Rs 35,000/- which would be better suited to bear floods in future. Unfortunately, the state has provisions for building only 60,000 houses under IAY. This would mean that nearly 5.84 lakh houses will be left uncared for. GoB proposes to tap resources from other departments to reduce the burden. Only time will tell how many houses are finally constructed. It must also be noted that all such houses cannot be built in North Bihar alone as the poor live in South Bihar too.

This year there were 7 breaches in the Bagmati embankments, 14 in the Kamla-Balan embankments, 5 in the Burhi Gandak, 3 in the Masan embankments and one each in the Bhutahi Balan, Khiroi and the Kosi (Badla-Nagarpara). Any lay person in Bihar can tell that the embankment loses its meaning downstream of the breach point.

As far as CRF is concerned, there are no unlimited funds available with it. In the past five years Bihar has received only Rs.123.66 Crores in 2000-01, Rs. 129.84 in 2001-02, Rs. 136.33 Crores in 2002-03, Rs. 143.15 Crores in 2003-04 and Rs. 150.30 Crores in 2004-05. GoB is supposed to add 25 per cent more to this sum to claim the Central assistance. One can well imagine the gap that exists between the available small funds to the tune of Rs. 150 Crores against a demand of Rs. 8,000 Crores. Some money may be available through the channels of National Calamity Contingencies Fund (NCCF) but that too is drop in the ocean. The rest will have to be borne by the state Government or by the affected family itself. GoB asserts that it has spent all the

money that it had with it (Rs. 850 Crores) to meet the flood disaster this year and it has further spent a sum of Rs. 250 Crores from other sources and has no money left to do any relief any more unless some help pours in from outside. The Chief Minister has requested the

Center to allocate funds for that but such requests have a history of getting ignored.

Unprecedented floods This year's flood in North Bihar broke many previous records. Continuous rains between 1st July to 2nd August in Bihar plains, Terai area of Nepal and the lower Himalayas brought life to a standstill for a very long time, the impact of which is felt still. It rained three to four times more than the average for weeks together and districts like Samastipur, West Champaran and Khagaria was virtually cut off from rest of the world for a considerable period. Elderly people of the area suggest that they had never seen so much of rain in their life nor had they experienced such a prolonged stagnation of rainwater.

Surprisingly, with so much of rains and rainy days and the accompanying losses due to floods, no major river of North Bihar touched the recorded highest flood level (HFL). The memorandum sent by the GoB to the Gol for seeking assistance for flood relief confirms this fact.

⇒ The HFL of the **Bagmati** at Sonakhan is recorded as 70.77 m but it could reach only 69.75 m this year.

⇒ **Burhi Gandak** remained stagnated above the danger level for weeks together this year, did not touch its record level of 46.35 meters at Rosera.

⇒ **Kamla-Balan** could touch 53.60 meters level at Jhanjharpur Rail Bridge against the HFL of 54.34 m.

⇒ **Bhutahi Balan** played havoc in and around Phulparas in the Madhubani district many times this year, did not touch the record level of 72.1 m at Ekamma siphon and flowed to a maximum level of 70.3 m.

⇒ **Lalbakeya** attained a level of 72.42 meters at Gowabari against the HFL of 72.84 meters.

- ⇒ **Ganga** has an HFL of 50.27 meters at Gandhighat but the observed maximum this year was 48.15 m.
- ⇒ **Punpun** flowed at 53.1 m at Sripalpur (HFL 53.91 m)
- ⇒ **Kosi**, at Basua, flowed at 48.01 m (HFL 48.76 m)
- ⇒ **Gandak** level below 95.8m at Khadda (HFL 96.85 m)

If the maximum level of all these rivers was much below the HFL, one would expect that the damages caused by the floods would be less but that was not to happen. The obvious explanation that comes to one's mind for this anomaly is that there were large number of breaches in the embankments, canals, roads and railway lines that led to moderation of flood levels in rivers and drainage congestion prevented the moderated floodwaters from escaping. The result was prolonged stagnation of water and nearly 25 million flood victims watched helplessly their dwellings and crops being washed away.

Embankments Water Resources Department (WRD) of GoB has constructed 3430 kilometers long embankments along Bihar rivers through which it intends to protect its 29 out of 69 lakh hectare of flood prone area. These structures, on which the GoB had so much faith as a barrier between the people and the river, breached at 32 places before a call of help was given to the Gol on the 28th August through the memorandum. There were 7 breaches in the Bagmati embankments, 14 in the Kamla-Balan embankments, 5 in the Burhi Gandak, 3 in the Masan embankments and one each in the Bhutahi Balan, Khiroi and the Kosi (Badla-Nagarpara). Any lay person in the flood hit area of Bihar can tell that the embankment loses its meaning downstream of the breach point. He can also tell that the bed level of the river within the embankments has gone up quite high leading to its reduced water carrying capacity and waterlogging in the protected countryside. The people living within the embankments are always at the mercy of God as the Govt does not recognize their existence. Their number in Bihar is in lakhs.

What is left of the newly constructed embankments on the Bagmati between Runnisaipur and Dharampur will be known only after the stock is taken once normalcy is restored but efforts are on to redo these embankments. This Rs 792 Crores project was started early this year to embank the hitherto untouched middle portion of the river. Some 10 km length of the same was constructed before the rains and whatever was constructed, got washed away in floods.

The GoB is reported to have sanctioned a sum of Rs 78 Crores to raise and strengthen the Kamla-Balan embankments. Kamla-Balan embankments have a

history typical to embanking technology. The river was embanked between Jainagar to Jhanjharpur in Madhubani district during 1956-60. These were further extended up to Darjia in 1962 and since 1965 flood season, these embankments are faithfully breaching every year. At times, people cut these embankments to

drain the stagnated water outside the embankments. In the floods of 1966, there was turmoil in Bihar Vidhan Sabha over massive breaches in these embankments. Members snubbed the Government over the performance of the embankments and even suggested that either the embankments should be removed or the people

should be shot dead. Central Water Commission sent a senior engineer, Moti Ram, on a request made by GoB and he suggested, along with many other things, raising and strengthening of the Kamla embankments. This suggestion came just within three years of completion of the embankment. Nobody asked GoB or the CWC why weak and low height embankments were constructed in the first place? Since then a caravan of veteran engineers is passing over these embankments making similar suggestions and sometimes the embankments are raised. The river and the embankments, however, refuse to obey them. WRD of GoB has asked for Rs 522 Crores to repair such embankments in the state.

This is not a huge sum but it would have been better if WRD had done some introspection before making the demand. In 1998, the present Deputy Chief Minister of Bihar was staging a sit-in strike in Darbhanga and his grievance was that the embankments had breached at 125 points in the state causing immense hardship to the people. WRD of Bihar refuted these charges saying that the embankments had breached only at 7-8 places and an equal number have been cut by the anti-social elements and all other breaches are there in the Zamindari and Maharaja embankments for the maintenance of which the WRD is not responsible. The press release of the WRD also said that it was responsible only for the flood protected area of 29 lakh ha in the state and the remaining area over which no protection measures have been taken up, the department cannot be held responsible.

If the WRD admits that its embankments have breached at 32 points (as against 8 in 1998) and none of these breaches are Zamindari or Maharaja embankments, it is hoped that the Deputy CM would remind WRD of its obligations to the people.

It is obvious that when an embankment breaches, it surely was meant to protect some land out of those 29 lakh hectares. The GoB should also explain to the flood

Surprisingly, with so much of rains and rainy days and the accompanying losses due to floods, no major river of North Bihar touched the recorded highest flood level HFL. Thus, one would expect that the damages caused by the floods would be less but that was not to happen. The obvious explanation for this anomaly is that there were large number of breaches in the embankments, canals, roads and railway lines that led to moderation of flood levels in rivers.

victims what plans it has to protect the remaining 40 lakh hectares of flood prone land of Bihar?

Bihar govt's proposals do not make sense WRD

suggests in the memorandum that efforts should be made for the Indo-Nepal Cooperation over the flood issue. This is something that is being said for the past 70 years without any success and it is difficult to make out any meaning of such an assurance.

Flood forecasting, afforestation, capacity building and establishment of a Flood

Management Institute at Patna has been proposed in the memorandum and a National Disaster Response Institute in Patna has also been proposed. A totally irrelevant proposal to desilt Bihar Rivers has been also made. It must be reminded here that the proposal to desilt heavily silt laden rivers like the one debauching into the Gangetic plains from Himalayas has been rejected to the extent of ridicule in the Report of the Rashtriya Barh Ayog (1980). That a proposal should come from Bihar is even more astonishing since it had desilted Eastern Kosi Main Canal a couple of years ago. There are hillocks of sand on either side of the canal and most of the slopes of the canal is eroding back into the canal with passage of time. The problem is not in desilting the river if one has the resources, the problem is where to dump the excavated material. The memorandum is curiously silent over the issue.

Similar is the situation with the Dept. of Road Construction. Some 782 kilometers length of roads in the state have almost collapsed with 54 breaches in them. The department has sought for a sum of Rs. 1586 Crores from the Center to bring back the roads in motor able shape. Breach in the road means that the rain water is looking for an opening at that point to pass through, which the department intends to plug. Condition of the rural road is even worse. A length of 3194 kilometers of such roads has been hit by floods with 829 breaches in them and its 1353 bridges and culverts need repairs / replacement. Such damages will never diminish if the state continues to ignore the drainage of water.

However, this year's flood has opened the flood gates of placing additional demands. Vital departments of the state from which people had expectations to protect them against floods are themselves queuing up for relief. One is reminded of the Mughal Emperor Jehangir whom anybody could access for alimony.

A villager went to meet him for help and found the emperor praying to the almighty for help. The villager came back without meeting the emperor saying that he

should not be expecting anything from a person who himself was begging. Sooner the people of Bihar realize this, the better it is.

In 1966 CWC sent a senior engineer on a request made by GoB and he suggested, raising and strengthening of the Kamla embankments. This was just within three years of completion of the embankment. Nobody asked GoB or the CWC why weak and low height embankments were constructed in the first place? Since then a caravan of veteran engineers is passing over these embankments making similar suggestions and sometimes the embankments are raised. The river and the embankments refuse to obey them.

Central Water Commission

CWC is an apex body of India to look after the irrigation and flood control in the country. Any trivial matter regarding these two issues cannot move any further without the nod of this institution. Ask CWC which year Bihar was hit by the worst floods in the history, the answer would be 2004.

This is because, according to CWC, 2004 was the year

when 4.99 million hectares (MH) of land in Bihar was inundated. This information must have been given to CWC by GoB. In fact, 2004 flood of Bihar was limited to 20 districts of North Bihar (Siwan and Saran faced no floods in 2004). Area of North Bihar is around 5.4 MH and the combined area of Siwan and Saran is 0.486 MH. Subtract this area from the area of North Bihar to get a figure of 4.914 MH implying that the flooded area of North Bihar was more than the actual area of the region. When this anomaly was reported in the press, the flood hit area of the state slumped down overnight to 2.772 MH in the reports prepared by Disaster Management Department of State. GoB, however, took precaution in retaining the flood affected area as 4.99 MH when it submitted a memorandum to the Prime Minister for assistance to combat the losses that year. Even Prime Minister's Office did not notice the fallacy in reporting and so did Ministry of Water Resources and the CWC. One wonders that in future if a relationship is drawn between the rainfall, highest flood levels of the rivers and the area affected due to floods in Bihar, will it not lead to erroneous conclusions? That is the seriousness with which data are handled by these august institutions.

GoB took another precaution. It has ceased to disclose the district wise flood affected area ever since to avoid any criticism. Even this year, the flood affected population of Sitamarhi district is indicated as 27.86 lakhs whereas the population of the district according to 2001 census is only 26.83 lakhs although the official website of GoB suggests a population figure of only 20.14 lakh. One should not be surprised if the GoB stops giving the flood affected population now onwards. However, accepting the credibility of whatever data and information is available, let us take a look at various devastating floods in the State in past.

1954 Floods Talk to any elderly person in North Bihar and he would tell you something about the devastation caused in the floods of 1954. This flood was limited to North Bihar only with an affected area of 2.46 MH and a population of 7.61 million (out of 18.393 million). This

flood affected 8119 villages (out of 21,107 villages) of North Bihar leading to the loss of standing crops over 15.96 lakh hectares. Some 1,79,451 houses were destroyed and 63 persons lost their lives in this flood. 1944 cattle had also perished in the floods this year. The flood loss was valued at Rs 50 Crores.

This was the year when the first Flood Policy of the country came into being and the proposal to dam the Kosi at Barahkshetra in Nepal was dropped in favour of embankments along the river citing the reason that the proposed dam would be a safety hazard for the people living in downstream areas. After this all the major rivers of Bihar were embanked and the process continues still. The flood prone area of Bihar in 1954 was 2.5 MH and the state had only 160 kms of embankments.

1974 Floods The impact of this year's flood was felt south of the Ganga also in the districts of Munger and Santhal Parganas and had a spread area of 3.182 MH. It had hit a population of 16.39 million and crops over 1.751 MH were lost. 5,16,353 houses were destroyed in this flood that killed 80 persons and 288 cattle. The total losses were put at Rs. 354.59 Crores.

Following the floods, the GoB appointed a committee to look into the flood damages and suggest means to combat floods under the Chairmanship of Kanwar Sain, former Chairman of CWC. This committee reiterated the idea of construction the Barahkshetra Dam on the Kosi and said that the embankments could only be a temporary solution to the flood problem of the state. Till 1974, there were 2192 kilometers long embankments within the state and it was claimed that they were providing protection to 1.5 MH. The flood prone area of the state, however, had shot up to 4.3 MH by this time.

1987 Floods This was the worst recorded flood of the 20th Century, the records set by that flood have not been broken so far (2007 included). This flood had not only mauled North Bihar, its impact was felt in South Bihar as well as Jharkhand (it was a part of Bihar those days) also. An area of 4.668 million area of present day Bihar and a population of 282.38 lakhs was hit by this year's flood that had engulfed 23,852 villages and destroyed crops over an area of 2.51MH. It further destroyed 16,82,059 houses killing 1373 persons. The state had deployed 53 army boats, 14,304 boats in N Bihar, 1366 boats in S Bihar and pressed in services 13 helicopters for rescue & relief operations. The rains that started on the 11th August continued almost non-stop till 19th August and no food packets could be dropped in

Madhubani, Darbhanga, Samastipur and Khagaria for about 3 weeks. Blocks like Alauli and Beldaur remained marooned till the end of October. The floods came again five times in days to come and Jhanjharpur (Madhubani) was inundated even after Diwali.

As per CWC Bihar was hit by the worst floods in the history in 2004 when 4.99 MH of land in Bihar was inundated. This information was supposedly given to CWC by GoB. In reality, 2004 flood of Bihar was limited to 20 districts of North Bihar whose total area is 4.914 MH implying that the flooded area of North Bihar was more than the actual area of the region. When this anomaly was reported, the flood hit area of the state slumped down overnight to 2.772 MH in the GoB reports. But CWC & Ministry of Water Resources continue to use the figure of 4.99 MH.

There were 3,321 kilometers long embankments in the state by 1987 that were expected to protect 2.873 MH of land against flooding. There were 104 breaches in these embankments and the flood prone area of the state had gone up to 6.461 MH. A committee under the Chairmanship of Naresh Chandra was appointed to look into the causes and remedy of floods in the state. The Report is

gathering dust somewhere in the CWC.

2004 Floods This year's flood was spread over 20 districts of North Bihar with an area over 2.772 MH (4.99 MH according to CWC) and a flood-hit population of 2.13 Crores. This flood had engulfed 9346 villages, destroyed crops over an area of 1.399 MH and swept away 929 773 houses killing 885 persons. Desperate attempts were made to paint 2004 flood as the worst ever flood in living memory; duping the PM was a collateral damage.

By this time the undivided Bihar had an embankment length of 3465 kilometers. 24 kilometers went to Jharkhand and another 11 kilometers was swept away. Remaining 3430 kilometers long embankments are still there with Bihar while the flood prone area of the state has gone up to 6.88 MH. Government of India had appointed another Task Force to look into the flood problem of the state and suggest remedy. This report, too, says that the flood affected area of Bihar in 2004 was 4.99 MH. One should not be expecting anything worthwhile from the report which is based on wrong footings. Constituting committees and Task Forces etc is just an extension of floods that provides post retirement employment to administrators and technocrats.

2007 Floods Much has been written earlier and it is not intended to repeat it here but it must be said here that whenever a phrase 'worst ever flood' is used, caution must be exercised. It suits all concerned, except the victims, if the worst ever flood strikes an area. Should miseries be marketed? Marketing managers could muster a statement from United Nations that Bihar was hit by worst ever flood this year which, it was constrained to modify later saying it meant South East Asia and not Bihar.

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POWER OPTIONS

Increasing Share of Renewables Globally According to the REN21 Renewables Global Status Report 2007, out of total global power capacity of 4300 GW (Giga Watts = 1000 MW), renewable (without large hydro, which in any case cannot be defined as renewable) energy now provides 240 GW power.

Wind Power Wind energy has the largest share of renewable energy capacity at 90 GW (11 times the capacity in 1997) and continues to grow at 25-30%. Germany, Spain and

US in that order have the highest share of wind power capacities. US, with 11575 MW installed capacity, is adding the highest capacity even now. One of the serious drawbacks of the wind power is that wind does not blow all the time and when it blows, the power demand may not be high. The surges of energy that power projects inject when wind blows could sometimes create problems. Denmark, which pioneered wind power in Europe, has recently seen stagnation of wind power capacity growth due to this reason. In fact, it exports much of the wind generated electricity to Norway and Sweden because the surges come at unpredictable times. In 2003, Ireland put a moratorium on connecting wind farms to electricity grid due to this reason. Sweden's Vattenfall has recently set up a USD 280 million wind power project, one of the largest in the world, at Malmo after the local campaign against it failed recently.

Suzlon plans Wind energy company Suzlon plans to increase its installed capacity of 2700 MW to 5000 MW over the next five years. It has raised USD 552 million through a qualified institutional issue to replay debts and is set to launch a USD 400 m fund to invest in wind energy assets. Meanwhile Suzlon got an order from Oil and Natural Gas Commission for 51 (34 X 1.5) MW wind power project to be set up in Kutch (Gujarat), including comprehensive operation and maintenance for ten years.

CFL to earn carbon credits in AP? Climate Change Capital, the largest independent carbon fund globally, has decided to invest Rs 300-400 crores in Andhra Pradesh to replace the traditional lamps by CFL (Compact Fluorescent Lamps) bulbs. An application has been made to the National CDM authority in India to approve this project as a clean development mechanism project. AP government and three distribution companies in Northern, Southern and Central AP will participate in it. Two Hyderabad based technocrats of Banyan Environmental Innovations have launched this project. It

"You have to think much more distributed than centralized, you have to solve the problem of storing energy, and it has to be much more like an internet system than the current grid is today in order to be effective"

is expected that the project will help wipe out the 12% power deficit of AP. (The Times of India 241207)

Birahiganga SHP: Invitation for Bids The Birahiganga Hydro Power Limited, a New Delhi company, has invited bids for transmission of power from the 2 X 2.4 MW Birahiganga small hydropower project in Chamoli District in Uttarakhand. (The Tribune 021207)

Haripur SHP goes to HC Affected people in Kulu district have filed a petition in the Himachal Pradesh High Court against the proposed 1.5 MW Haripur Small Hydro Project, saying that the No

Objection Certificate has been given by the government to a Non-Resident Indian company on Aug 30, 2007, without considering the fact that in 2005, the project site was listed in unsafe sites in the government Report. The project could risk the trout farm in the downstream. (Divya Himachal 01x07)

New Outlook required in Power Sector "You have to think much more distributed than centralized, you have to solve the problem of storing energy, and it has to be much more like an internet system than the current grid is today in order to be effective" says Dr Wade Adams, Director, Richard E Smalley Institute for Nanoscale Science and Technology. While most industries rely on technologies that have been invented or updated in the last few years, the electricity delivery industry uses technologies that have more or less stayed the same for 100 years. One technology still in the research and development phase is the "armchair quantum wire," made from tubes of carbon 100,000 times thinner than a human hair, called carbon nanotubes. When these nanotubes are made into a larger wire, they can conduct electricity far more efficiently and over far greater distances than the copper wires used today. A leading researcher of carbon nanotubes, Dr. Wade Adams says these nanotube wires can theoretically conduct 100 million amps of current

Two Hyderabad based technocrats of Banyan Environmental Innovations have launched a project to replace the traditional lamps in AP by CFLs. It is expected that the project will help wipe out the 12% power deficit of AP.

over thousands of miles without much loss in efficiency. Today's wires conduct around 2,000 amps of current over hundreds of miles, with about 6 to 8% of the electricity lost in the form of heat. According to Adams, these armchair quantum wires will also be one sixth the weight of current wires and so strong that they won't need support mechanisms. Of course, transmission lines made from carbon nanotubes are about 10-15 years away from commercialization. According to the Electric Power Research Institute, a California-based energy think tank, the cost of upgrading the grid with "smart" technologies could be \$100 billion. Some analysts have put the figure at around \$150 bl. (www.renewableenergyaccess.com 091107, Indian Express 261107, Financial Express 181207, 221207, The Hindustan Times 211207)

SOLAR POWER

Continued from p 1

A paper by University of Sydney professor David Mills describes a field of almost flat mirrors focusing the sun's rays on fixed tubes held by poles above the mirrors. Such mirrors are easier and cheaper to build than the parabolic troughs, and can be made strong enough to withstand hurricanes like those in Florida. And rather than using the troughs' oil-filled tubes, which sap power to pump the oil, Mills uses the sun's heat to turn water directly into steam. The cost of power from such plants is comparable with those from coal plants, it is claimed.

Based on this technology, Ausra, a company promoted by Vinod Khosla (co founder of Sun Microsystems) among others, will build a 177 MW Solar-Thermal Plant. The plant, expected to deliver power to PG&E in the summer of 2010, will be built in San Luis Obispo, Calif. The startup claims it can deliver electricity at a cost of 10.4 cents per kilowatt-hour. The Power purchase agreement was signed in early Nov 2007. It will need 1 sq mile land for this.

In late September 2007, Ausra, Pacific Gas & Electric (PG&E), and Florida Power & Light (FPL) announced commitments for 1,000 MW of solar thermal power. The details are still in negotiation. The current plan is to start with a 10 MW demonstration plant in Florida, then expand to 300 MW. These facilities could be ready earliest by 2010.

Ausra says it can potentially cut costs to 7.9 cents per kilowatt-hour in three years. That compares with an estimated 16 to 18 cents per kwh for other solar-thermal electricity and about 9.7 cents per kwh for coal-fired power plants today. Ausra doesn't have a large plant in place yet, but it already has installed its 1 MW plant in Australia and is growing that project to 5 MW by Jan 2008 and up to 12 MW later. Ausra also is working on installing a 6.5 MW project in Portugal that it expects to finish in 2009. And it is building a 5 MW demonstration plant in California as a "scale test".

The article in Scientific American quoted earlier presented a grand plan that could provide 69 percent of the U.S.'s electricity and 35 percent of its total energy

(which includes transportation) with solar power by 2050, to be sold to consumers at rates equivalent to today's rates for conventional power sources, about five cents per kWh.

Photovoltaic Cells Ever since the first PV cell was created by Bell Labs in 1954, the efficiency with which a cell can convert light into electricity has been the technology's Achilles' heel. Photons from the sun arrive at the semiconductor sporting many different energies, not all of which will liberate an electron. Each

In a very significant development, based on a new technology, a new company called Ausra will build a 177 MW Solar-Thermal Plant. The plant, expected to deliver power to PG&E in the summer of 2010, will be built in San Luis Obispo, Calif. Ausra claims it can deliver electricity at a cost of 10.4 cents per kilowatt-hour, comparable with tariff of power from a coal fired plant. The Power purchase agreement was signed in early Nov 2007. It will need 1 sq mile land for this.

semiconducting material has a characteristic "band gap" – an energy value which photons must exceed if they are to dislodge the semiconductor's electrons. The movement of the electrons thus dislodged creates the current. If the photons are too weak they pass through the material, and if they are too energetic then only part of their energy is converted into electricity,

the rest into heat. Some are just right, and the closer the photons are to matching the band gap, the greater the efficiency of the PV cell.

Bell Labs discovered that silicon, which is cheap and easy to produce, has one of the best band gaps for the spectrum of photon energies in sunlight. The past decade has seen a sea change as inexpensive cells with an efficiency of 20 per cent have become a commercial reality, while in the lab efficiencies are leaping forward still further. Last year, Allen Barnett and colleagues at the University of Delaware, Newark, set a new record

with a design that achieved 42.8 per cent energy conversion efficiency. Barnett says 50 per cent efficiency on a commercial scale is now within reach. Such designs, married to modern manufacturing techniques, mean costs are falling fast too. According to Martin Green at the

University of New South Wales, Australia, it should be possible to create cells from other materials with a 74 per cent efficiency limit.

One of the cheapest cells to manufacture is the thin-film cell, in which semiconductor compounds are sprayed onto a flexible substrate. Thin-film cells use as little as 1 per cent of the volume of materials that ordinary PV cells demand (thus slashing the costs substantially), and the band gap of the cells can be improved by adjusting the

proportions of the ingredients that form the film. For example, cells that use a low-cost blend of copper, indium, a pinch of gallium, and selenium (CIGS), have already achieved an efficiency of around 19 per cent in lab tests. The material's efficiency is so high that researchers have shifted their attention to slashing the cost of producing the cells.

The Scientific American wrote in Dec 2007, the least expensive modules today are thin films made of cadmium telluride. To provide electricity at six cents per kWh by 2020, cadmium telluride modules would have to convert electricity with 14 percent efficiency, and systems would have to be installed at \$1.20 per watt of capacity. Current modules have 10 percent efficiency and an installed system cost of about \$4 per watt. The technology is advancing quickly; commercial efficiencies have risen from 9 to 10 percent in the past 12 months. The efficiency of the cadmium telluride cells at the National Renewable Energy Laboratory are now up to 16.5 percent and rising. Installations already in place indicate that the land required for each gigawatt-hour of solar energy is less than that needed for a coal-powered plant when factoring in land for coal mining.

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"The big limiting factor of solar power is that it generates little electricity when skies are cloudy and none at night. Excess power must therefore be produced during sunny hours and stored for use during dark hours. Most energy storage systems such as batteries are expensive or inefficient. Compressed-air energy storage has emerged as a successful alternative. Electricity from photovoltaic plants compresses air. The pressurized air is released on demand to turn a turbine that generates electricity, aided by burning small amounts of natural gas. Compressed-air energy storage plants have been operating reliably in Huntorf, Germany, since 1978 and in McIntosh, Ala., since 1991. The turbines burn 40 percent of the natural gas they would if they were fueled by natural gas alone, and that figure can be lowered to 30 percent... Indeed, a compressed-air energy storage system would look similar to the U.S. natural gas storage system. The industry stores eight

The past decade has seen a sea change as inexpensive cells with an efficiency of 20 per cent have become a commercial reality, while in the lab efficiencies are leaping forward still further. Last year, Allen Barnett and colleagues at the University of Delaware, Newark, set a new record with a design that achieved 42.8 per cent energy conversion efficiency. Barnett says 50 per cent efficiency on a commercial scale is now within reach.

trillion cubic feet of gas in 400 underground reservoirs... these facilities would add three or four cents per kWh to photovoltaic generation, bringing the total 2020 cost to eight or nine cents per kWh" writes Scientific American.

SunFab film, an innovation from California based Applied Materials Inc, is only 10 nanometers thin, it has the thickness of three atoms or is 10 000 times thinner than human hair. Similarly, in 2007, Silicon Valley-based Nanosolar has created the manufacturing technology that could make the promise of thin film cell a reality, with backing from Google's founders and \$20 million from the U.S. Department of Energy. In San Jose,

Nanosolar has built what will soon be the world's largest solar-panel manufacturing facility. CEO claims that once full production starts early next year, it will create 430 MW worth of solar cells a year. California recently launched the Million Solar Roofs initiative, which will provide tax breaks and rebates to encourage the installation of 100,000 solar roofs per year, every year,

for 10 consecutive years (the state currently has 30,000 solar roofs).

Comparable power cost In parts of Japan, California & Italy, where the retail price of electricity is among the world's highest, the cost of solar-generated electricity is now close to, and in some cases matches, that of electricity generated from natural gas & nuclear power. In the US the average price of conventionally generated

electricity is around 10 cents per kWh. The cost of solar-generated electricity has fallen to roughly 20 cents. This has created a booming market for PV cells – now growing by around 35 % annually.

Booming market First Solar Inc, a Phoenix based company in US that makes modules used in solar panels, reported its third

quarter profit up 10 times to \$ 46 m, as sales more than tripled to \$ 159 m. The company that went public a year ago at \$ 20 a share, closed at \$ 215 on Nov 30. Its total market value exceeds that of General Motors or Ford Motors. Q Cells AG in Germany reported third Q profit of \$ 50 m and forecast 2009 sales of \$ 2.5 billion compared with \$ 700 m in 2006. Suntech Power Holdings in China had a third Q profit of \$ 53 m.

The value of stocks in companies whose business focuses primarily on solar power has grown from \$40 billion in Jan 2006 to more than \$140 billion today, making solar power the fastest-growing sector in the global marketplace.

Germany In Nov 2003, amid rising oil and gas prices and growing concern over global warming, the German parliament agreed a "feed-in tariff" programme, which guarantees a market for solar power. Anyone who produces electricity from solar power can sell it to the national grid for \$0.45 - 0.57 per kilowatt-hour, which is almost three times what consumers pay for their electricity, roughly \$0.19 per kilowatt-hour. The feed in tariffs are locked in for 20 years. Germany's power-generating companies are required by law to pay this premium, which is guaranteed until 2024. Today there are over 300,000 PV systems in Germany, mostly on the rooftops of homes and small businesses, and Germany is the world's fastest-growing PV market. It has 55 per cent of the world's installed base of PV panels and can generate around 3000 MW of electricity from solar energy. On Nov 27, '07, the German minister announced that the German government plans to speed up its planned cuts in support for rooftop photovoltaic energy from 2009 (by 7% per annum) and again from 2011 (by 8% per annum).

Last year, following in Germany's footsteps, Italy and Spain launched their own tariff programmes, while the California Solar Initiative earmarked \$2.8 billion for cash incentives that will subsidise new PV installations to the tune of up to \$2.50 per watt, with the aim of creating 3000 MW capacity by 2016.

Recently, Spanish clean-energy giants Abengoa Bioenergy and Acciona have jumped in with solar thermal projects in Spain, Algeria, and the US. Israel's Solel Solar Systems has contracted with PG&E to deliver 553 MW from future solar thermal plants.

Algeria An Algerian company is planning to build a power cable to Germany to export solar-generated electricity from the Sahara. The 3,000 km cable would be laid from the Algerian town of Adrar to the German city of Aachen under a project provisionally entitled "Clean Power from the Desert".

China Solar wafer maker Peng Xiaofeng (worth USD 4.4 B dollar in share market) from China is proof that there is money in protecting the environment. Peng is chief executive of China's LDK Solar, a company founded two years ago, which has cashed in on government subsidies and soaring public demand to go green. The company recently announced a major contract with solar cells manufacturer Germany's Q-Cells AG.

Germany-based Conergy AG, a leading solar energy company in Europe, is looking to tap China's budding renewable energy market. The company estimates that by 2015, renewable energy will evolve into a market of over \$300 billion across the world, with much of it coming from China. Since June 2006, the company has been rapidly expanding across Asia-Pacific and now has offices in Singapore, South Korea, India, Australia, Thailand and Malaysia.

Japan Japan's Sharp Corp said it would invest US\$ 200

million to boost output capacity for thin-film solar cells more than tenfold by Oct 2008. Thin-film solar cells use one-hundredth of the silicon needed in conventional solar cells, cutting production time and costs. The world's No. 1 maker of solar cells said it planned to expand output capacity for thin-film cells to 160 MW per year from the current 15 MW at its Katsuragi Plant in western Japan.

India's Achievements According to the website of the Government of India's Ministry of New and Renewable energy (<http://mnes.nic.in/>), India's achievements in solar energy by Sept 30, 2007 are as follows.

Grid-interactive Solar Power	2.12 MW
Decentralised Energy Systems	
Solar Photovoltaic Programme	110 MW (peak)
i. Solar Street Lighting System	61,321 nos.
ii. Home Lighting System	3,63,399 nos.
iii. Solar Lantern	5,64,931 nos.
iv. Solar Power Plants	2.18 MW (peak)
Solar Thermal Programme	
i. Solar Water Heating Systems	2.00 million sq. m. collector area
ii. Solar Cookers	6.17 lakh
Solar Photovoltaic Pumps	7068 nos.

Solar Companies in India

⇒ **Roth and Rau**, a Germany-based solar cell manufacturing solutions provider, sees India emerging

as the fourth largest generator of solar energy and a key driver of its global business in the coming years. It is expecting orders worth 80 million euros from India in 2008 from two million euros at present. At the current pace of 20 percent annual growth, India can emerge as the fourth largest generator of solar energy after Germany, Japan and China in the coming years. It had entered the solar equipment-manufacturing segment in India in 2004. Currently four Indian solar cell manufacturers including Central Electronics Ltd and Maharishi Solar were sourcing equipment from Roth and Rau.

Conergy Plans The German renewable energy major Conergy has started its business in India in 2007, and has commissioned a manufacturing unit for solar

modules and components in Bangalore. The company operates through three divisions globally: Conergy which sells solar modules and solar units, Epuron which plans, finances and executes renewable energy projects and SunTechnics which plans, implements and installs solar and bio-energy units. SunTechnics have been in India for two years. The company generated revenues of about Rs 13 crore during 2006 and is expecting about Rs 70 crore this year. The plan is to drive triple digit growth in India annually. Conergy is one of the fastest growing renewable energy companies in the world. Its revenues grew more than 40% to hit a turnover of about \$1 billion in 2006. The company is expecting 30-33% revenue growth globally this year.

⇒ **Moser Baer** Photo Voltaic plans to set up a Rs 330 crore silicon photovoltaic cell manufacturing plant in India and it has tied up with US based Applied Materials for that. It has submitted an application to set up a demonstration solar power project in W Bengal. Applied Materials has also tied up with Signet for solar power business.

⇒ **Solar Semiconductor**, another photovoltaic company, has lined up an investment of \$40 m to set up two production units in Andhra Pradesh.

Reliance plans 10 MW plant in W Bengal Reliance Industries Ltd has decided to set up a 10 MW solar plant in W Bengal, possibly in Purulia and sought govt help.

⇒ An unknown Texas (US) based company has offered to set up a 250 MW solar power plant in Punjab if they are given suitable land. They claim to provide power from the plant at the rate of Rs 9 per unit. An Israel based company has been asked to set up a 1 MW PV cell solar power plant in Kapurthala as a pilot plant that can be replicated widely.

Constrains India has huge potential for using solar power. Current focus of the government is to set up solar power panels for lighting and other minimum needs as a means of taking power to the off grid 80 000 villages. But

Solar Power has potential beyond that. High prices are the biggest deterrent. Cost price of one kwh of power from solar photovoltaics in India is Rs 15, reported the Economic Times (131107), but this is not based on any large scale plant. Similarly the same paper reported that it would cost Rs 25 crore to set up a 1 MW solar photovoltaic plant.

It is claimed that the cells also needs to be replaced every 7-8 years. But better prospects could be power plant based on solar thermal units the cost of which could be half of that from PV cells, as is being majorly developed in US. Indian government needs to come out with encouraging policies, including subsidies, soft loans and most

importantly, right feed in tariffs to push solar energy in India. Such units can also get Carbon Emission Reduction Credits under UNFCCC's Clean Development

Mechanism, which will be an added advantage in India. This will also be a better option than going for costly and unsafe big hydro and nuclear power mirage.

(CHINA DAILY 230507, Business Week 151007, US's Popular Science Magazine 011107 The

Economic Times 031107, 131107, Greentechmedia.com 051107, Reuters 151107, 281107, 301107, 121207, Tribune 281107, IANS 301107, Financial Express 021207, 061207, 181207, New Scientist 081207, Mint 141207, Scientific American Magazine 161207, see DRP Sep-Oct 2007 (p 19))

“The big limiting factor of solar power is that it generates little electricity when skies are cloudy and none at night. Excess power must therefore be produced during sunny hours and stored for use during dark hours. Most energy storage systems such as batteries are expensive or inefficient. Compressed-air energy storage has emerged as a successful alternative... Compressed-air energy storage plants have been operating reliably in Huntorf, Germany, since 1978 and in McIntosh, Ala., since 1991. The turbines burn 40 percent of the natural gas they would if they were fueled by natural gas alone, and that figure can be lowered to 30 percent... Indeed, a compressed-air energy storage system would look similar to the U.S. natural gas storage system. The industry stores eight trillion cubic feet of gas in 400 underground reservoirs...”

California recently launched the Million Solar Roofs initiative, which will provide tax breaks and rebates to encourage the installation of 100,000 solar roofs per year, every year, for 10 consecutive years (the state currently has 30,000 solar roofs).

11th Five Year Plan – Why it may not achieve the irrigation targets

In the following table we have given the state wise figures for proposed outlay (Rs Crores) and expected irrigation potential to be created (thousand ha) for Major, Medium and ERM (Extension, Renovation, Modernisation) Projects, as per the working group report for the 11th Five Year Plan, chaired by the Secretary, Union Ministry for Water Resources. The figures are given separately for Completed, Ongoing and New projects for Major, Medium and ERM projects. See some notes at the end of the table about these figures.

SN	State	Category	Major projects		Medium Projects		ERM		Total	
			Outlay Proposed	Expected Irrigation Pot. Created						
1	AP	Completed	229.791	46.61	157.166	4.8	118.553	0	505.51	51.41
		Ongoing	26378	2778.983	487.264	83.82	936.74	42.38	27802.004	2905.183
		New	7250	105.22	109.7	10.67	2350	0	9709.7	115.89
		Total	33857.79	2930.813	754.13	99.29	3405.293	42.38	38017.21	3072.483
2	Arunachal	Completed	0	0	0	0	0	0	0	0
		Ongoing	0	0	0	0	0	0	0	0
		New	0	0	64.3	6.87	0	0	64.3	6.87
		Total	0	0	64.3	6.87	0	0	64.3	6.87
3	Assam	Completed	34.13	0	7.4309	0	0	0	41.56	0
		Ongoing	207.235	76.658	21.014	7.382	32.919	21.541	261.168	105.581
		New	0	0	158.48	19.09	0	0	158.48	19.09
		Total	241.365	76.658	186.9249	26.472	32.919	21.541	461.208	124.671
4	Bihar	Completed	15.71	0	15.44	0	0	0	31.15	0
		Ongoing	1883.71	596.89	44.14	5.84	355.13	187	2282.98	789.73
		New	1274.66	596.14	0	0	23.55	12.85	1298.21	608.99
		Total	3174.08	1193.03	59.58	5.84	378.68	199.85	3612.34	1398.72
5	CG	Completed	0	0	3.8886	0.2	20.4395	0	24.3281	0.2
		Ongoing	164.64	96.46	112.92	42.73	0	0.6	277.56	139.79
		New	559.85	183.69	899.8	128.04	0	0	1459.65	311.73
		Total	724.49	280.15	1016.608	170.97	20.4395	0.06	1761.538	451.72
6	Goa	Completed	0	0	0	0	2.37	0	2.37	0
		Ongoing	136.668	13.999	0	0	0	0	136.668	13.999
		New	0	0	0	0	0	0	0	0
		Total	136.668	13.999	0	0	2.37	0	139.038	13.999
7	Gujarat	Completed	0.5	0	9.43	6.38	0	0	9.93	6.38
		Ongoing	12742.72	0	70.79	26.15	425.4	46.87	13238.91	73.02
		New	2502.5	0	51.08	6.45	1283.2	147.62	3836.78	154.07
		Total	15245.72	0	131.3	38.98	1708.6	194.49	17085.62	233.47
8	Haryana	Completed	68.79	0	0	0	55.36	0	124.15	0
		Ongoing	54.77	0	0	0	80.42	0	135.19	0
		New	204.39	0	20	0	150	0	374.39	0
		Total	327.95	0	20	0	285.78	0	633.73	0
9	HP	Completed	0	0	0	0	0	0	0	0
		Ongoing	85.337	12.732	95.12	12.38	0	0	180.457	25.112
		New	0	0	0	0	0	0	0	0
		Total	85.337	12.732	95.12	12.38	0	0	180.457	25.112
10	J&K	Completed	0	0	4.89	0.79	6.28	0	11.17	0.79
		Ongoing	0	0	55.25	25.6	94.287	7.6	149.537	33.2
		New	0	0	109.435	0	15.665	0	125.1	0
		Total	0	0	169.575	26.39	116.232	7.6	285.807	33.99
11	Jharkhand	Completed	0	0	15.27	0	0	0	15.27	0
		Ongoing	2274.27	341.9	283.59	62.75	0	0	2557.86	404.65
		New	474.39	7.81	72.5	3.47	115	19.7	661.89	30.98
		Total	2748.66	349.71	371.36	66.22	115	19.7	3235.02	435.63
12	Karnataka	Completed	0	0	36.46	0.72	0	0	36.46	0.72
		Ongoing	4856.4	401.2	502.2	16.1	95.76	0.1	5454.36	417.4
		New	218	22.26	1612.4	0	0	0	1830.4	22.26
		Total	5074.4	423.46	2151.06	16.82	95.76	0.1	7321.22	440.38

SN	State	Category	Major projects		Medium Projects		ERM		Total	
			Outlay Proposed	Expected Irrigation Pot. Created						
13	Kerala	Completed	69.37	0	0	0	0	0	69.37	0
		Ongoing	266.7	0	251.13	0	36.2	0	554.03	0
		New	44.93	0	10.3	0	0	0	55.23	0
		Total	381	0	261.43	0	36.2	0	678.63	0
14	MP	Completed	28.05	0	16.12	0	0.74	0	44.91	0
		Ongoing	4791.82	447.33	266.97	79.42	168.89	3.38	5227.68	530.13
		New	796.43	0	295.5	16	0	0	1091.93	16
		Total	5616.3	447.33	578.59	95.42	169.63	3.38	6364.52	546.13
15	Maharashtra	Completed	501.3	64.5	187.34	7.38	0	0	688.64	71.88
		Ongoing	13337.19	1234.29	3334.13	190.43	120.22	8.28	16791.54	1433
		New	355.08	13.73	1333.12	52.53	0	0	1688.2	66.26
		Total	14193.57	1312.52	4854.59	250.34	120.22	8.28	19168.38	1571.14
16	Manipur	Completed	0	0	0	0	0	0	0	0
		Ongoing	143	29	40.25	7.55	16.95	16.71	200.2	53.26
		New	16	12	29.67	19.73	0.36	0.4	46.03	32.13
		Total	159	41	69.52	27.28	17.31	17.11	246.23	85.39
17	Meghalaya	Completed	0	0	0	0	0	0	0	0
		Ongoing	0	0	56.36	0	0	0	56.36	0
		New	0	0	0	0	0	0	0	0
		Total	0	0	56.36	0	0	0	56.36	0
18	Nagaland	Completed	0	0	0	0	0	0	0	0
		Ongoing	0	0	50	7.54	0	0	50	7.54
		New	0	0	0	0	0	0	0	0
		Total	0	0	50	7.54	0	0	50	7.54
19	Orissa	Completed	10	0	5	0	0	0	15	0
		Ongoing	2031.78	254.5	258.04	62.25	45.23	63.43	2335.05	380.18
		New	5078.08	20	246.48	25.68	398.88	0	5723.44	45.68
		Total	7119.86	274.5	509.52	87.93	444.11	63.43	8073.49	425.86
20	Punjab	Completed	0	0	0	0	55.05	0	55.05	0
		Ongoing	791.83	0	12.03	0	107.67	0	911.53	0
		New	21.43	0	0	0	261.175	0	282.6	0
		Total	813.26	0	12.03	0	423.895	0	1249.18	0
21	Rajasthan	Completed	232.92	0	4.1	0	190.2	0	427.22	0
		Ongoing	254.66	177	310.73	42.7	281.99	38.75	847.38	258.45
		New	937.69	278	0	13.6	0	0	937.69	291.6
		Total	1425.27	455	314.83	56.3	472.19	38.75	2212.29	550.05
22	Tamil Nadu	Completed	0	0	0	0	0	0	0	0
		Ongoing	0	0	7.4	0	10.47	0	17.87	0
		New	0	0	0	0	0	0	0	0
		Total	0	0	7.4	0	10.47	0	17.87	0
23	Tripura	Ongoing	0	0	56.829	8.968	0	0	56.829	8.968
		Total	0	0	56.829	8.968	0	0	56.829	8.968
24	Uttaranchal	Completed	0	0	0	0	0	0	0	0
		Ongoing	0	0	0	0	0	0	0	0
		New	419.38	0	0	0	0	0	419.38	0
		Total	419.38	0	0	0	0	0	419.38	0
25	UP	Completed	20.83	0	0	0	28.64	0	49.47	0
		Ongoing	2516.94	713.57	0	0	609.525	510.64	3126.465	1224.21
		New	209.041	247.26	72.29	13.77	357.08	748.36	638.411	1009.39
		Total	2746.811	960.83	72.29	13.77	995.245	1259	3814.346	2233.6
26	WB	Completed	0	0	11.4	12	0	0	11.4	12
		Ongoing	609.5	242.2	9.6812	0	383.45	96	1002.63	338.2
		New	195.1	0	9	0	57.76	0	261.86	0
		Total	804.6	242.2	30.08	12	441.21	96	1275.89	350.2

(Total figures on next page)

Total allocations and expected irrigation in the 11th Plan

	Category	Major projects		Medium Projects		ERM		Total	
		Outlay Proposed	Expected Irrigation Pot. Created	Outlay Proposed	Expected Irrigation Pot. Created	Outlay Proposed	Expected Irrigation Pot. Created	Outlay Proposed	Expected Irrigation Pot. Created
Total	Completed	1211.391	111.11	473.936	32.27	477.633	0	2162.958	143.38
	Ongoing	73527.17	7416.712	6325.838	681.61	3801.251	1043.281	83654.258	9141.603
	New	20556.951	1486.11	5094.055	315.9	5012.67	928.93	30663.671	2730.94
Grand Total		95295.512	9013.932	11893.829	1029.78	9291.554	1972.211	116480.895	12015.923

As noted elsewhere in this issue of *DRP*, the 11th Plan was cleared by the National Development Council meeting on Dec 19, 2007 and one of the major pillars of the plan is to achieve agricultural growth rate of 4%. And achieving that growth rate is crucially dependent on increasing the area under irrigation. It is clear from official data (see the cover story in *Dams, Rivers & People*, Sept-Oct 2007) even after spending 100 000 crores over the twelve years from 1991-92 to 2003-04, there has been zero addition to the net irrigated areas by major and medium (M&M) irrigation projects. On the contrary, there has been a massive reduction of 3.14 m ha in irrigation from such projects in this period. And yet the Working Group Report for the 11th Plan continues to propose massive allocation of Rs 133 000 crores for M&M irrigation projects.

The total proposed allocation in the above table, however, comes to Rs 116480, because some of the allocations for big irrigation are sectoral and hence will not reflect in project wise figures. Secondly, some of the states and Union Territories are missing in the above table, and their allocations would be additional. The above allocations should also be considered provisional as these are the recommendations of the working group and it is not clear to what extent the Planning Commission has included these in the Plan cleared by NDC. That plan is not yet public as we write this.

There are some additional riders about the figures given in these tables. In some of the projects, the allocations are done, but corresponding addition in irrigation are not specified. For example, in case of the controversial Sardar Sarovar Project, the working group has recommended that there should be an allocation for 12711.47 crores during the 11th Plan, the corresponding

figure for addition of irrigated areas gives the figure of zero. It seems the working group does not want to hazard how much area will be added by SSP during the 11th Plan after that massive doze of finances. Even without adding the irrigation likely to be added by such projects for which allocations are being made, the above table says that the plan will add 12.02 million ha of additional irrigation during the 11th Plan. The authors of working group however, decided to be slightly more modest and said that the likely addition is going to be 9 million ha, considering the gaps in the past between targets and achievements.

In spite of these riders, we can safely say that the 11th plan is not likely to achieve its objective of adding 9 million ha from M&M irrigation projects, nor achieve the projected 4% growth rate in agriculture. This is because the planners seemed to have no lessons from the past experience of such projects. As noted earlier, the real life line of India's irrigation sector, as also of the water sector is groundwater and this lifeline can be sustained only by harvesting rain where it falls to ensure its optimum use storage and recharge nearest to the occurrence of the rainfall. M&M irrigation projects seek to achieve this at the farthest from the site of occurrence of the rainfall.

In the 9th and the 10th plan (as in the past), over 80% of the planned allocation for irrigation was allocated for M&M projects. These plans have failed to add any irrigation from M&M projects, as we have shown from official documents. That was one of the major reasons why the agricultural growth rate in these plans remained around 2%. We hope, for the sake of the millions of farmers that 11th Plan performance is better than this. Will it be?

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In the 9th and the 10th plan, over 80% of the planned outlay for irrigation was allocated for major and medium projects. These plans have failed to add any irrigation from M&M projects, as we have shown from official documents. That was one of the major reasons why the agricultural growth rate in these plans remained around 2%. We hope, for the sake of the millions of farmers that 11th Plan performance is better than this. Will it be?

SSP: Mounting Costs, Minimal Benefits

Mounting Financial Costs According to the working group report on Water Resources for the 11th Five Year Plan, the total cost of the Sardar Sarovar Project (SSP) has already become a colossal figure at Rs 45673.86 crores. It is not clear if this cost is only that of irrigation component or it is total project cost. In either case, this figure is more than the cost that Narmada Bachao Andolan had predicted at Rs 44 000 crores in early 1990s. Then, the project proponents had laughed at the NBA projection. Now it seems NBA's projection has turned out to be an under estimate! It is interesting to see how the costs have been mounting in recent years.

According to the working group report on Water Resources for the 11th Five Year Plan, the total cost of the Sardar Sarovar Project (SSP) has already become a colossal figure at Rs 45673.86 crores. This is likely to go upto Rs 70 000 crores. The current official figure is below the NBA estimate of Rs 44000 crores, done in early 1990s.

responded in January 2007 that the cost of power component of SSP was Rs 1551.86 crores at 1988-89 price level and it went up to 5502 crores as per latest estimates. (The response of Sardar Sarovar Narmada Nigam Ltd in this regard was misleading as they said that the cost of power component at 2005-06 level is Rs 1970.02 crores.) The reasons given by the Sardar Sarovar Narmada Nigam Ltd for the cost escalation are, "the increase in the cost of material at the time of its purchase and the change in the exchange rate of Japanese Yen Vs Rupees as the contract was amended in 1999 after the withdrawal of the World Bank assistance."

Sr No	Year	Document	Cost, Rs Crores
1	1988	Clearance letter from Planning Commission	6406
2	2002	10 th Plan Document (1991-92 prices)	13180
3	2005	10 th Plan Mid Term Appraisal	30823
4	2007	11 th Plan working Group report	45674

It is certain that this latest figure is would also turn out to be an underestimate and the actual project cost may go above Rs 70 000 crores. This is because, the working group report for the 11th Plan accepts that the project will certainly go on beyond the 11th Plan, that is beyond 2012. In fact, out of the likely spill over cost of Rs 18159.24 crores, the working group has recommended allocation of Rs 12711.47 crores during the 11th Plan. And the working group has not found itself in a position to predict how much irrigation potential will be added with this expenditure, and in fact it left the figure at zero for potential added from all the ongoing Major and Medium irrigation projects from Gujarat, including SSP!

The Working Group also stated that expenditure on the project by the end of the 9th Plan (March 2002) was 12663.76 crores and another Rs 14850.66 crores is expected to be spent on SSP by the end of tenth plan (March 2007).

Power benefits delayed, time and cost over run In response to an application under RTI (Right to Information) Act, the Central Electricity Authority (CEA)

The CEA also agreed that there was delay in commissioning of various units of the River Bed Power House (RBPH) and Canal Head Power House (CHPH). The original and the actual dates of commissioning are given in the following table, as informed by CEA.

Unit No	RBPH		CHPH	
	Original date	Actual date	Original date	Actual date
1	1994-95	01.02.05	1994-95	04.10.04
2	1994-95	30.04.05	1994-95	16.08.04
3	1995-96	30.08.05	1994-95	31.08.04
4	1995-96	13.10.05	1995-96	03.09.04
5	1995-96	07.03.06	1995-96	15.12.04
6	1995-96	20.06.06		

CWC: "As per the decision taken in the 78th meeting of the Narmada Control Authority held on 3.5.2007 the back water studies is being carried out afresh considering the completion / construction of number of projects upstream of Sardar Sarovar Dam and the back water affect in the upstream tributaries also. A sub-committee has been formed consisting of the members of all beneficiary states and central govt agencies."

Here it is important to note that the dam height reached the level of 110.64 m on June 30, 2004. This is the height at which both RBPH and CHPH units can start generating power. Had all the units been installed by June 2004, they could have started generating power, but as is apparent from above table, none of the CHPH or RBPH units were ready as on June 30, 2004.

In fact the last unit of CHPH was commissioned 5.5 months after this date and the first unit of RBPH was commissioned seven months after that date. This meant huge loss of power to the nation and there should have been an enquiry why this delay occurred. But no enquiry was done, nor was anyone held responsible for this. It seems power generation is not a priority for SSP.

Incidentally, here it should be noted that in response to RTI application, the dates of original commissioning schedule given by the Sardar Sarovar Narmada Nigam Ltd and Sardar Sarovar Construction Advisory committee for RBPH were those of 2004 to 2006, clearly an incorrect information was given by them. Why they had to give such misleading information is not clear.

Mounting Displacement According to Central Water Commission (CWC), "The maximum back water level for Maximum Water Level (140.21 m) behind Sardar Sarovar Dam till it merges with normal water flow is EL 159.243 m and for Full Reservoir Level (138.68 m) till it merges with normal water flow is 156.667 m. This was computed for every 10 000 ft interval from Sardar Sarovar Dam". However, this back water computation was done in 1983-84, as per the award of the Narmada Water Disputes Tribunal. They have accepted that this assessment won't include full back water impact.

The CWC has accepted in response dated August 17, 2007 to an application under the RTI Act that the full backwater impacts of the Sardar Sarovar Dam have not yet been assessed, "The computation was worked out for the construction stages of Sardar Sarovar Dam and the flooding in the upstream tributaries of the Narmada River in the submergence zone was **not** considered in the earlier back water computations. As per the decision taken in the 78th meeting of the Narmada Control Authority held on 3.5.2007 the back water studies is being carried out afresh considering the completion / construction of number of projects upstream of Sardar Sarovar Dam and the back water affect in the upstream tributaries also. A sub-committee has been formed consisting of the members of all beneficiary states and central government agencies."

When this assessment is completed, the number of people to be displaced by this project will mount further even as the governments have been unable to provide the legally mandatory minimum resettlement package to those already affected.

Minimal Power Benefits In the Table below (see next column) power generation figures from the SSP and Indira Sagar Project (ISP, Madhya Pradesh), both on the Narmada River, are given since the month in which power generation started from these projects. We have included the figures of power generated at ISP as it gives an indication of how much water may have been released from ISP in respective months, as that would become available at downstream SSP. In fact, one of the design functions of ISP to is to provide regulated releases for the SSP.

All power generation figures are from Monthly Generation reports of the government of India's Central Electricity Authority (www.cea.nic.in). Let us see some trends visible from these figures.

1. Power generation at CHPH has been lower in Sept to Dec 2005 compared to corresponding months in 2004, because there was more water available to pass through CHPH in 2004 as RBPH was not yet commissioned. In 2005, with some units of the RBPH having been commissioned, only the required quantity of water was allowed to pass through CHPH.

Month wise Power Generation at SSP & ISP

Month/ year	Sardar Sarovar Project			Indira Sagar (IC)
	RBPH (IC)	CHPH (IC)	Total (IC)	MU (MW)
0104	0	0	0	55 (250)
0204	0	0	0	71 (375)
0304	0	0	0	66 (375)
2003-2004	0	0	0	192
0404	0	0 (450)	0 (450)	29 (500)
0504	0	0 (450)	0 (450)	23 (500)
0604	0	0 (450)	0 (450)	76 (500)
0704	0	0 (450)	0 (450)	95 (625)
0804	0	4 (150)	4 (150)	326 (625)
0904	0	33 (200)	33 (200)	280 (625)
1004	0	38 (200)	38 (200)	100 (750)
1104	0	26.62 (200)	26.62 (200)	114.46 (750)
1204	0	26.14 (200)	26.14 (200)	90.01 (875)
0105	20.97 (200)	0 (200)	20.97 (400)	89.35 (875)
0205	53.87 (200)	12.55 (200)	66.42 (400)	74.17 (875)
0305	35.88 (200)	10.01 (200)	45.89 (400)	46.93 (875)
2004-05	110.72	149.98	260.70	1348.76
0405	17.92 (400)	1.69 (250)	19.61 (650)	25.58 (1000)
0505	17.02 (400)	2.73	19.75 (650)	23.34
0605	103.82 (400)	10.05	113.87 (650)	112.92
0705	217.69 (400)	18.95	236.64 (650)	489.95
0805	200.20 (600)	22.30	222.50 (850)	483.90
0905	245.40 (600)	29.93	275.33 (850)	379.62
1005	304.57 (600)	16.35	320.92 (850)	267.72
1105	209.91 (800)	17.52	227.43 (1050)	190.19
1205	143.49 (800)	20.51	164.00 (1050)	190.84
0106	147.94 (800)	19.54	167.48 (1050)	167.66
0206	114.5 (1000)	16.92	131.42 (1250)	133.37
0306	30.40 (1000)	32.26	62.66 (1250)	98.88
2005-06	1752.86	208.65	1961.51	2575.97
0406	0	12.05	12.05	115.12
0506	75.3	6.94	82.24	103.29
0606	200.43 (1200)	8.85	209.28 (1450)	137.81
0706	278.22	22.31	300.53	127.54
0806	563.13	15.00	578.13	467.63
0906	602.03	22.12	624.15	227.59
1006	505.20	19.31	524.51	260.78
1106	459.64	22.16	481.80	393.66
1206	365.81	21.28	387.09	324.90
0107	193.39	28.86	222.25	261.37
0207	79.15	25.53	104.68	94.33
0307	49.74	24.68	74.42	91.67
2006-07	3372.04	229.09	3601.13	2605.69
0407	126.74	24.50	151.24	91.67
0507	72.65	12.93	85.58	101.87
0607	2140.98	9.77	224.75	135.34
0707	796.60	34.95	831.55	529.42
0807	788.86	50.83	839.69	441.52
0907	587.00	15.85	602.85	178.12
1007	329.51	19.52	349.03	250.52
1107	338	21.87	359.87	283.12

IC: Installed Capacity mentioned till the station reaches full design capacity; MU: Million Units; generation figures for Nov '07 are tentative

2. Power generation at CHPH has been lower in June, August & Sept in 2006 and March 2007 compared to

corresponding months in previous year. What this means is that less water was allowed to go through canals in 2006-07 compared to corresponding months previous year, which is strange, since with increased irrigated area in 2006-07, in fact more water should have been allowed to go through the canals. This shows that a lot of the water that flowed into canals in 2005-06 (and also 2004-05) was not used for irrigation or water supply but possibly for unplanned use (e.g. allowing water into rivers or filling lakes).

3. Power generation at CHPH has been lower in Sept 2007 compared to corresponding month in 2006. This is indeed strange as irrigation water demand should be high in September and in 2007 more area should have been under irrigation. Similarly, power generation at RBPH has been lower in Sept, Oct and Nov 2007 compared to corresponding months in the previous year. This seems to be due to reduced power generation also at ISP in the upstream in these months.

4. Power generation at RBPH and also ISP peaked in July 2007. Power generation at CHPH peaked in August 2007. Power generation at RBPH was 3372.04 MU in 2006-07 and is likely to go up further in 2007-08. Power generation at ISP in 2006-07 is marginally (about 1%) higher than that in the previous year, but is likely to go up in 2007-08, going by the trends so far.

5. Power generation at CHPH in 2006-07 was marginally (<10%) higher than that in the previous year, which indicates that the irrigation in 2006-07 has not gone up significantly compared to that in the previous year.

6. One can see from above that since August 2004, the CHPH at SSP has produced power in every single month, except January 2005. In January 2005, CHPH could not generate power due to breach in SSP main canal and attended repairs. The RBPH did produce 20.97 MU power in that month. This means that every month since August 2004, the level of water in SSP reservoir has been above 110.2 m and there has been sufficient water in the river upstream of the dam for power generation.

7. This is further substantiated by the figures in the last column in the above table, where the power generation at the upstream Indira Sagar Project on Narmada in MP

is tabulated. Here again we can see that ISP has been producing power every single month since January 2004 when power generation at ISP was commissioned. It should be noted here that ISP has a greater storage capacity and releases water into the river after power generation, most of which is available at the downstream SSP. Thus regulated, predictable water has been available at SSP every month (actually every day), for release into the canals and to be used for irrigation or

water supply in Gujarat since August 2004 at least, when the first unit of CHPH was commissioned.

8. Moreover, there is a huge water storage of 3665 million cubic meter at 110.64 m and 2600 million cubic meter at 100 m. SSP has been using that water since 2000-01, first by pumping water from existing reservoir into the canal, then since August

2002 through Irrigation By Pass Tunnel (IBPT) and since August 2004 through CHPH and this water has been used for water supply and irrigation, besides allowing the water to flow into rivers like Sabarmati and into lakes in Gujarat.

9. In 2005-6, CHPH produced 208.65 MU power. This means that if on average the reservoir level remained around 11.64 m (it could have gone up slightly some times in Monsoon and could have gone down slightly in summer) and if power generation efficiency is assumed

as 90% (that is 90% of the potential energy is converted into power) then we see that at least 3.8 MAF water had flowed into SSP canal during 2005-06 even if no water had flown through IBPT. (If water had also flown through IBPT, then the amount of water that entered the canals would have been even higher.) In fact the efficiency

is more likely to be about 80%, in which case, at least 4.28 MAF water had flown into canals during the year. This is even more than the 3.5 MAF water claimed by Gujarat when the clearance was given to increase the height of the dam to 110.64 m. And this water was available almost on daily basis. However, Gujarat has been unable to put even 10% of this water to use as is clear from the area irrigated in 2005-6 (57 000 ha) and water supply provided during 2005-6 (2044 villages and 57 towns).

10. Dam height reached 110.64 m in June 2004 and 119 m in June 2006, 121.62 m in Oct 2006.

It is apparent from the information supplied by the CEA that none of the CHPH or RBPH units were ready as on June 30, 2004 when the dam height was reached to start generating power. In fact the last unit of CHPH was commissioned 5.5 months after this date and the first unit of RBPH was commissioned seven months after that date. This meant huge loss of power to the nation. It seems power generation is not a priority for SSP.

According to Gujarat Government's Socio Economic Reviews of various years (the latest one available is for 2005-06), in each of the last three years for which such reports are available, the benefits from water conservation measures (including check dams) are far greater than those from the SSP. Critics of SSP have been proved right by the figures from Gujarat Government!

Irrigation Benefits: Check dams beat the SSP

According to the quarterly reports published by Sardar Sarovar Narmada Nigam Limited, as required under the law, the Command Area Development (CAD) work completed at SSP, which gives one indication of the irrigation achieved at command areas has been as follows.

Sr No	Date	CAD completed, ha
1	31.12.2005	97000
2	31.03.2007	140 740
3	30.06.2007	276 562
4	30.09.2007	279 308

The 11th Plan working group claims that potential created by the end of 9th plan (March 2002) was 1.3075 lakh ha. It has projected that by the end of 10th plan (March 2007), an additional potential of 3.3468 lakh ha would have been created from this project.

The figures from the above table show that both these claims are gross exaggerations, as the area for which Command Area Development Work were completed by March 2002 and March 2007 were much lower than the figure claimed by respective plans for irrigation potential created. It is high time the working group and the Planning Commission does some checking of the claims made by the Gujarat Government to them.

According to Gujarat Government's Socio Economic Reviews of various years (the latest one available is for 2005-06), in each of the last three years for which such reports are available, the benefits from water conservation measures (including check dams) are far greater than those from the SSP, as can be seen from the table below.

Benefit by	Maximum utilisation, lakh ha	
	SSP	Water conservation programme
2003-04 (by June '03)	0.25	2.15
2004-05 (by June '04)	0.25	3.5
2005-06 (by June '05)	1.08	3.5

The critics of the SSP have all along been saying that if water conservation measures are adopted all across the state, they will provide greater benefits than SSP, at a lesser social, environmental and financial costs and at a faster pace. It is clear that the critics of the SSP have been proved right on this count too.

Water Available at SSP Following an application under RTI Act, the Sardar Sarovar Narmada Nigam replied that 3.659 MAF (Million Acre Feet) water flowed through CHPH in 2005 and 3.56 MAF water flowed through

CHPH in 2006. Similarly, 6.48 MAF water flowed through RBPH during 2005 and 12.082 MAF water flowed through RBPH during 2006. What this means is that Gujarat could get 10.139 MAF water at SSP during 2005 and 15.642 MAF during 2006. Gujarat and Rajasthan's total share at SSP is 9.5 MAF water from Narmada as per the Narmada Water Disputes Tribunal Award. What this means is that Gujarat got more than its due share at SSP, even at current height of the dam and that too well distributed through out the year. Gujarat (and by implication Rajasthan) could not use the available water only because the canal systems have not yet been constructed to make it possible for Gujarat to use that water.

Proposal to Redesign SSP In such a situation, a crucial question arises, if Gujarat has any case for asking for increasing the height of the dam from the current level of 121.92 m to the final design level of 138.68 m? (This

What this means is that Gujarat could get 10.139 MAF water at SSP during 2005 and 15.642 MAF during 2006. Gujarat and Rajasthan's total share at SSP is 9.5 MAF water from Narmada as per the Narmada Water Disputes Tribunal Award. What this means is that Gujarat got more than its due share at SSP, even at current height of the dam and that too well distributed through out the year. Then what is the need to increase the height of the dam?

increase will be affected through installation of 30 spill way gates of two different sizes.) As we have seen above, Gujarat is able to get its rightful share even as per NWDT award (even if we forget for the moment that amount of water available in the Narmada river is about 16% less than that assumed by NWDT.) at the current height. Similarly, all the power units are functioning at the current

height. Once Gujarat and Rajasthan (and also the upstream state of Madhya Pradesh) develop the system to make full use of its share of water, there will be no surplus water available for power generation at RBPH. It could function as a pump storage unit, provided the downstream Garudeshwar weir is constructed (there is no activity on ground on this currently, as a visit to the site confirmed recently), but for that there is no need for increase in height of the dam. The spill way gates are required for safety of the dam, but an assessment can be made to find options and implications for this. By not increasing height of the dam from the current level, about 50% of the proposed submergence area can be saved, as also the cost of increasing the height is saved. Most of the affected people of Madhya Pradesh will not have to be displaced.

It is clear that there are huge benefits in looking into this proposal of not allowing any further increase in height of the dam beyond the current level. As shown above, this will have not impact on the benefits or water availability. The state governments of Gujarat, Madhya Pradesh, Maharashtra and Rajasthan as also the union government can show great leadership and sensitivity towards the displaced people and environment by

making such an assessment in a credible manner and also implementing it. Will they?

Need to reassess all ongoing big irrigation schemes

There is another important reason why such redesign proposals need to be considered for all ongoing irrigation projects of the country. Since the Fifth five year plan the governments have said at the time of formulation of a new five year plan, that there has been unjustified proliferation of big irrigation schemes, draining the limited financial and other resources of the state and the society. Recent evidence from government figures show that the big irrigation projects have added zero additional irrigation over the last twelve years. It is high time that the government shows political will to take steps to weed out the unviable

It is high time that the government shows political will to take steps to weed out the unviable and unjustifiable scheme even among ongoing schemes. In this process, the schemes for which substantial expenses have been incurred and which cannot be scrapped all together, there is the option of reassessing the schemes to reduce its scope as proposed for SSP. Economic, hydrological, social and environmental prudence demands that this be done urgently.

and unjustifiable scheme even among ongoing schemes. In this process, the schemes for which substantial

expenses have been incurred and which cannot be scrapped all together, there is the option of reassessing the schemes to reduce its scope as proposed for SSP. Economic, hydrological, social and environmental prudence demands that this be done urgently.

Considering all factors highlighted here (and some more), it is clear that there is

no case for increasing the height of the SSP beyond the current height. The government of India should immediately initiate steps to ensure that the SSP is stalled at the current height.

SANDRP

SSP NEWS

Corruption exposed at public hearing Thousands of affected persons thronged Jhanda Chowk on Dec 15, '07 in Badwani, to inform the public hearing panel members such as Shri Annasaheb Hazare, noted social activist against corruption, Shri Arvind Kejriwal, Right to Information activist and Magsaysay Award winner, Shri M.S. Mushrif, Inspector General of Police (former) Maharashtra and Shri Anand Kotadia, senior social activist, not just about the total lack of rehabilitation but the rampant corruption that mars the rehabilitation process and the strong nexus between the dalals and rehabilitation officials. People also clearly demonstrated how, due to corruption, the entire process of rehabilitation was now reduced to a money laundering exercise with the principles of ensuring their being better-off even after displacement being thrown to the winds. At the end of the Public Hearing and visits to submergence villages and R&R sites, the Panel declared, as their interim finding, that indeed corruption is rampant due to the collusion between dalals and officials, and further that clearly, affected persons were still in their villages and not rehabilitated yet. The panelists then proceeded to visit Kharya Bhadal (M.P.) where they had close interactions with representatives of the submergence villages in Alirajpur tehsil (M.P.) and Akrani tehsil (Maharashtra).

Slow pace of Investigation The special group set up by the Madhya Pradesh government to investigate into the issues connected with the fraudulent registry to claim compensation in the name of Sardar Sarovar project affected persons is moving very slowly in spite of repeated reminders by the Chief Minister and this is turning out to be to the benefit of the corrupt officials and

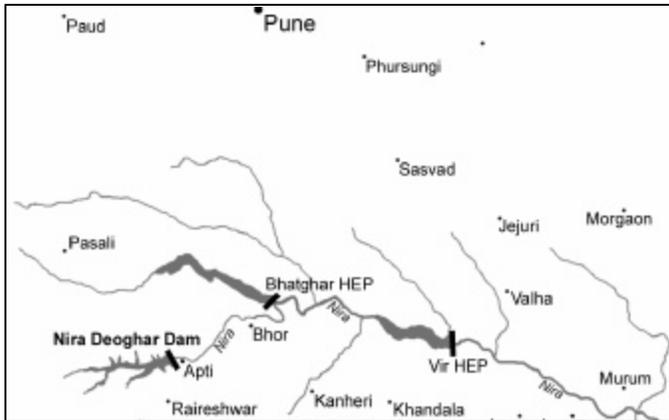
the middlemen. Due to the involvement of Patwaris, some of the lands have changed names even as the original land owners remain in the dark.

NVDA officials and dalals try new tricks The officials of the Narmada Valley Development Authority, government of Madhya Pradesh and the middlemen who were involved in pocketing compensation for the Sardar Sarovar Project affected people by some 750 fraudulent registry of land purchase and against whom investigations are going on are now trying new tricks. They are getting the affected people sign an affidavit that it was the mistake of affected people and that the affected people will buy real land in a year and register the same. This way the officials and the middlemen are trying to prepare grounds for their escape from the clutches of law. The affected people have written to the Chairman of Narmada Control Authority, complaining against this. (*Dainik Bhaskar* 11x07, 201107, NBA 201207)

SSP drinking water scheme a flop: Congress The leaders of the Congress have said that the Sardar Sarovar Project based drinking water project in Gujarat was a flop and the scheme invited strictures from the Public Account Committee. The opposition party from Gujarat accused the state government of financial irregularities with contracts worth Rs 668 crores being awarded to incompetent contractors. The trouble is, Congress was quite non serious in raising these issues and it failed to raise real people's issues through out its five year tenure as opposition party. That was one of the reasons why it got defeated in the assembly elections, the results of which were announced on Dec 23, 2007. (*The Times of India* 141207, SANDRP)

Privatisation of Nira Deogarh Irrigation Project in Maharashtra: Serious implications

Nira Deogarh Irrigation Project (NDIP) in Maharashtra's Pune-Satara-Sangli districts will be the first major privatisation of a major irrigation project in the country where the private player can manage the river and supply water for irrigation and domestic use for profit on a BOT (Build, Operate, Transfer) basis. The Nira Deogarh project consists of a 59 m high and 2320 m long dam on the river Nira, located about 90 kms south of Pune near the now displaced Deogarh village. The dam has a total storage capacity of 337.3 million cubic meters.



On Nov 17, '07, five companies responded to the Expression of Interest issued by the Maharashtra Krishna Valley Development Corp. Cleverly worded, the EoI keeps the "experience" of the companies which could bid open to generous interpretation. It invites companies which have worked on projects of a "similar magnitude". In effect, it allows any player who has handled a Rs 1,000 crore project in any area to bid. So far the companies that have come forward--Ashoka Buildcon, IVRCL Infrastructure Projects, IL&FS, Shinde Developers, Indian Hume Pipes Company--have little or no experience in managing an irrigation project. Worse, some have never been even remotely involved in any water projects!

At stake is nearly 208 km of the Right Bank Canal and 21 km of the Left Bank Canal, along with four lift schemes of the Nira-Deogarh project that will irrigate nearly 43,000 ha. The private player will invest money and complete the construction of the remaining 5 % of the dam, build 164 km of canals and put in place the water distribution network. In return, he will have complete control over the river, the dam & its water.

While there are crucial ethical issues involved when privatising something as basic as a water resource, the mismanagement of the Nira-Deogarh project by the Maharashtra government is shocking. The Nira-Deogarh irrigation project was originally envisaged in 1984 as a Rs 62 crore project. So far, nearly Rs 450 crore has been spent on it: Rs 196 crore in building 95 per cent of

the dam, Rs 93.63 crore on canals, Rs 87 crore on acquiring land and Rs 21 crore on rehabilitation. Rs 50 crore went on "other" expenses. Now it says that another Rs 1,000 crore has to be pumped in to complete the project. Anyone who invests Rs 1,000 crore will have to recover the money as well as generate profits.

The EoI also promises the private company a "reasonable rate of return" via contract farming through land owners. Obviously, farmers, who were kept in the dark while the EoI was issued are up in arms. Says Dilip Ghadge, an onion and sugarcane farmer in Satara's Lonand taluka: "What all this means is that the large companies will come and sit on our land while we are driven out. It will be the last nail in our coffin."

Since 1981, Balasaheb Bagwan of Lonand village in Satara district of Maharashtra, advocate, and president of the Khandla Taluka Pani Panchayat has been fighting for the construction of a dam on the Nira River so that Khandala and other neighbouring talukas, all drought prone, can get water for irrigation. The dam, Nira Deogarh, has now been ready for several years, but Balasaheb's mission is still not complete. The waters still don't reach the fields. "This is a drought-prone area where we have already had a major drought during 2003-2005. The privatisation of the river will break the farmer's back. How can a private company own the whole distribution network of the dam?" he asks.

Dr Bharat Patankar, who built up the equitable water distribution movement (Saman Pani Watap Chalwal) over several decades in southwestern Maharashtra, is shocked at the govt's move. Maharashtra government issued vide an dated July 15, 2003 (GR No. BOT/702 (425/2002)/MP-1) declaring its policy of privatisation of irrigation projects. The World Bank, under its \$325 million Maharashtra Water Sector Restructuring project, is pushing for privatisation of irrigation projects.

According to the report of the working group for the 11th Five year plan, Rs 259 crores have been spent on the project before 9th plan, Rs 130.84 crores were spent during 10th plan. That leaves spill over cost of Rs 521.07 crores out of the latest estimated project cost of Rs 910.91 crores. A question that arises is, how come this spill over cost of 521 crores (as per the latest govt estimates), now suddenly almost double to Rs 1000 crores? Even if we take the figure of Rs 800 crores mentioned in the EOI notice, it still needs to be justified. Secondly, when MKVDC took up the project, what had it planned for the financial mobilization and why was the project taken up without proper planning? In stead of going for privatisation, should not those responsible for this mismanagement held responsible and action taken? (Outlook 071207, India Together 171207, 11th Plan working Group Report on Water Resources Development, layout map by Swarup Bhattacharya, also see *Dams Rivers & People* Sept-Oct '07 p 21)

WATER SECTOR**Question marks over Gross National Water Availability Estimates**

In an Article titled *Alarming scarcity of water in India* in Current Science (Oct 10, 2007) Dr NK Garg and Dr Q Hassan, raise some serious questions over the water availability estimates of the Central Water Commission (CWC) and Report of the government of India's National Commission on Integrated Water Resources Development (Sept 1999). The article reaches some correct conclusions:

- Overexploitation of groundwater (in certain areas) needs urgent attention on terms of encouraging recharge.
- Almost all basins are likely to reach deficit status by 2050. The authors do not say it, but this raises question on viability of the River Linking proposals.
- It raises some serious questions about the methods of estimation of water availability.

However, on some counts there are serious doubts about the study, some of which are listed below.

⇒ The study almost uncritically accepts the estimations of National Commission on Agriculture (NCA) and based on that tries to make estimates of water availability. However, NCA had estimated total water available in country at 1050 BCM (Billion Cubic Meters) and the paper congratulates NCA for the best methodology adopted. But the authors than go on to show this to be an over estimation!

⇒ This paper estimates that 308 BCM would be available from storages (compared to 250 BCM assumed by NCA), 313 BCM would be available from natural recharge of groundwater (350 BCM by NCA) and 47 BCM would be available from return flows, including non monsoon surface water flows (450 BCM by NCA), this last estimate by this paper needs further explanation as it does not convincingly show how they arrive at that figure, which almost one tenth of the NCA figure.

⇒ The study throughout assumes that there is just 3 BCM of total storage capacity available through small storages, which is clearly a fictional figure that has been use by the various reports and authors for over 2 decades. To illustrate, in Maharashtra alone, there is storage capacity of 4.2 BCM through minor projects as per the latest report from the state govt on storage capacity in various regions of the state.

⇒ Similarly, the study uses outdated figures for storage capacities available in India through large projects. The study could have used the latest (2006) figures from Central Water Commission which estimate that total storage capacity created is 212.78 BCM, total capacity under construction is 76.26 BCM. In case of some of the basins (e.g. Krishna) the ultimate storage capacity assumed in the study is already overtaken by the capacity of completed projects and those under construction as reported by CWC.

⇒ The article reaches the wrong conclusion that there is need "to complete all possible storage works on priority basis". Since the article mostly talks about large storages, this is bound to be taken as a recommendation for completing all big storages on priority basis, clearly a wrong conclusion on many counts. For example, SANDRP's research shows that the big irrigation projects have not added a single hectare of additional net irrigated area for the last twelve years, on the contrary, the net irrigated area has fallen by over 3 M ha in this period. The existing storages are silting up, they remain utilised as is apparent from the water stored at the beginning of the monsoon and they also remain empty to significant extent. The govt has been unable to allocate resources for their proper operation and maintenance. What is in fact required is to provide available resources for the optimum utilisation of created infrastructure, weed out the unviable projects even from ongoing projects and redesign them where necessary and stop investing in big projects till all this is achieved. In the meantime, investments for local water systems must continue.

⇒ For water use from storages, the analysis assumes that storages will be filled to 100% (a wrong assumption), that 20% will be losses, that 80% of the stored water will be used. This is rather too simplistic assumption. In reality, any storage gets used multiple times, as the water is used even as it is getting filled, and there are also inflows after the monsoon. Thus a 100 MCM storage could provide water upto 150-200 MCM water if the inflows are available.

⇒ The conclusion of the paper that all regions in the country had reached over exploitation stage of groundwater use in 1997 itself, is clearly wrong. In over 50% of the areas groundwater levels are not depleting. The study assumes rather low groundwater availability figures for most regions.

⇒ Similarly, the conclusion of the analysis of the study for 1997 assumes that all basins had the water available for all the uses in respective basins. These are a bunch of incorrect assumptions for many of the basins were already facing deficits in that year.

⇒ The study could be faulted on a number of other counts (e.g. ecological flows, etc), but we have not gone into all these aspects here.

⇒ The study's estimate of 668 BCM available ultimately clearly seems an underestimate.

What we need is a basin wise study of water availability starting from rainfall, storage capacities (all sizes), their effective use, aquifer capacities and also estimations of water use (for various purposes and from various sources) aggregated from sub basin estimates.

SANDRP

DAMS**NEAA quashes Polavaram clearance**

The National Environmental Appellate Authority has on December 19, 2007 quashed the environmental clearance given to the Polavaram project as the environmental public hearing was not held in Orissa and Chhattisgarh as required under the Environment Clearance Notification of 1994 under which the project was given clearance. The project would submerge land and displace thousands of people in Orissa and Chhattisgarh and hence public hearing in these states is required to be held. The order said, "The appeal is partially allowed to the extent that the impugned Environment Clearance order No J -12011/74/2005-IA I dated 25-10-2005 issued by Respondent 1 (MoEF, GoI) is quashed on the grounds that the impugned order was passed taking into consideration the Public Hearing which by itself was incomplete as it was not conducted in affected areas of Orissa and Chhattisgarh resulting in denial of access to information and opportunities to the affected people to express their views/opinion etc. on the Environment Impact of the project and consequential violation of Principles of Natural Justice". Now public hearings will have to be conducted in these states, and than fresh clearance will have to be sought. The project, authorities, unfortunately will not face any penalties. The NEAA has not explicitly ordered stoppage of work on the project, we learn, but that should be a logical consequence of this order. The petition was filed by the Academy for Mountain Environics, Delhi. According to Ritwick Dutta, Counsel for Academy for Mountain Environics and coordinator of Legal Initiative for Forest and Environment, "this is the first instance in the ten years of working of the NEAA that an environmental clearance granted by the MoEF has been quashed and therefore is truly a historic decision".

Struggle over Hirakud water A strong movement has been going on in Orissa against the state government move to divert the Hirakud water for industrial use and in the process deprive the farmers of their share in water. In Nov '07 over 30 000 farmers held a rally against the move, forcing the opposition parties in the state to become active on this issue and also forcing the state govt to promise that no water would be diverted from agriculture use.

Displacement before dam or rehabilitation in MP In a shocking case, the people of Mangrol village in Mandsoaur district in Madhya Pradesh have been displaced without rehabilitation even as the construction of the barrage over Retam river is still ongoing. People were told to leave their villages before the monsoon, citing the threat due to submergence due to under construction Rs 33 crore barrage project. People were in fact threatened that if they do not leave, bull dozers will be called to destroy their houses. The displaced people of the village, 55 km from the district head quarters, have

been spending over five months without homes and now they are spending cold winter nights out in the open. People are yet to get even the compensation for the land and property lost by them. Three other villages that will be partially affected are: Vishanya (116 families), Mangrol Chak (35 families) and Dipukheda (6 families). (Dainik Bhaskar 191207, 201207)

Dam breach in TN A minor irrigation dam in the Dindigul district breached on Dec 21, 2007 after one of its shutters collapsed under the weight of floodwaters, PWD officials said. Three fishermen, who were fishing in the Kudavanaru river, were rescued. The dam level stood at 25 ft (Max level 26 ft). Fifteen villages downstream had been issued flood warning. Meanwhile, most of the tanks and dams are overflowing in Tamil Nadu with the Vaigai, Papanasam, Sathanur and Amaravathi dams almost full. Water is being discharged from these dams causing floods in Vaigai, Manimutharu and Tamirabarani rivers. An official press release said 49 people have been killed across the state during Dec 17-21, '07. (The Hindu 221207)

INTERLINKING OF RIVERS

Intrastate River linking in TN, Bihar At the 54th National Development Council meeting in Delhi on Dec 19, 2007, Tamil Nadu CM demanded that the Interlinking of Rivers Project should be declared a National Project. He also demanded funds for the intra state links that TN wants to take up should be allocated by centre. The TN CM said this was agreed at the 53rd NDC meeting in May '07. However, Andhra Pradesh CM opposed the TN's draft proposal as it included the transfer of Godavari waters to Cauvery basin. Bihar CM said that they would also like to take intrastate linking of rivers to solve the drought and flood problem. Madhya Pradesh CM raised the issue of expeditious completion of Detailed Project Report of the Ken Betwa Link proposal.

TN plans The Tamil Nadu PWD department has done a macro analysis about linking the rivers of the state. The study gives priority to linking the Cauvery River with the Vaigai River to transfer flood waters from Cauvery to Vaigai basin for providing the water to Pudukottai, Sivaganga, Ramanathapuram and Virudhunagar districts and also benefit Karur and Tiruchi. The existing Kottalai bed regulator across the Cauvery near Karur will be converted into a barrage for flood water storage. A 255 km long canal will be constructed from Kottalai to Gundar, connecting Agniar, South Vellar, Pambar and Kottakariyar Vaigai Rivers with Gundar in phases. The study suggested that since 1975, the Mettur reservoir on Cauvery surplussed in 15 years (so 45% dependability) for five to 81 days. The link can also divert surplus waters of Ariyar and Koraiyar during the NE monsoon to protect the Tiruchi and Srirangam towns. Phase 1 costing Rs 1000 crores would include the construction of barrage and the canal and this investigation is expected to be completed by March 2008. Total project would require 3684 ha of land, including 2228 ha of patta land. (The Hindu 071107, 201207, Asian Age 201207)

HYDROPOWER PROJECTS

Ghatghar PSP delayed The 250 MW Ghatghar Pump Storage Project in Maharashtra has been delayed further. Originally expected to be commissioned in 2004-05, the Union Power Ministry has asked the state govt to ensure that its commissioning in 2007. The state govt says it is delayed due to non availability of reversible turbines. (Financial Express 201207)

Baglihar delayed, more glitches The 450 MW Baglihar hydropower project commissioning is further delayed as more technical problems have surfaced recently. The new date now proposed is June 2008. When completed, it is likely to be one of the costliest HP projects of India.

⇒ **Phase 2 also in trouble** The 450 MW Baglihar 2 is also facing serious geological problems due to unfavorable rock mass conditions. A High powered team under Central Electricity Authority's member (hydro) has been appointed to resolve the issues. The geology consultant appointed by the state govt has suggested an alternative of 2 X 225 MW configuration, but the state power department engineers prefer 3 X 150 MW, saying there is insufficient water storage capacity for the former. The prospects of blasting for the Phase 2 tunnels are also posing geological risks for the Phase 1. (The Economic Times 12x07, IANS 211207, The Hindu 241207)

Irregularity at Karcham Wangtoo? It seems Andritz VA Tech Hydro has been awarded two contracts in India worth a total of US\$302M for the complete electromechanical equipment for six Pelton and also supply four Francis units. The vertical Pelton turbines are to be installed in the Teesta III hydropower project by August 2011. The nominal output of the plant will be 1200MW. The contract was awarded the contract for the electro-mechanical equipment by Teesta Urja Ltd. Jaiprakash Industries awarded the contract for the Francis units, which are to be installed at the 1,200MW Karcham Wangtoo plant on the Satluj river also by August 2011. The units are to be erosion resistant with ceramic coating because the river carries significant loads of sand during the rainy season. The orders came via the group's local affiliates VA Tech Hydro India Pvt Ltd and VA Tech Escher Wyss Flovel Ltd. This is strange as the sanctioned installed capacity for the Karcham Wangtoo HP is 1000 MW. Why have the company ordered machines for 1200 MW? Who will pay the extra cost of the machines beyond the sanctioned capacity? Will it also be a pass through cost for tariff calculations? (Waterpower magazine 211207)

HYDROPOWER PROJECTS – NORTHEAST INDIA

Subansiri Downstream study: Ultimatum to NHPC The All Dhemaji District Students Union have given an ultimatum to the National Hydroelectric Power Corporation to stop work on the under construction 2000 MW Subansiri Lower Hydropower Project till the report of the downstream impact study is public. The Union has warned that it will launch a vigorous campaign against

the campaign if the work is not stopped. As per the understanding reached between NHPC, Assam Govt & All Assam Students Union on Dec 8, '06, NHPC was to stop work on the HP pending completion of the study.

Union Power Minister informed the Loksabha on Nov 30, '07 that NHPC has awarded a study on March 15, '07 to look into the downstream environmental impacts of Subansiri Project to Indian Institute of Technology, Guwahati with the following terms of reference:

⇒ Forecasting the flow situation downstream on ten daily/ monthly basis through reservoir simulation study with standard operating policy / optimal operating policy.

⇒ Forecasting flood situation downstream due to possible sudden release of water either due to dam failure or due to need of releasing water in the event of extreme rainfall in the upper catchments during reservoir full condition.

⇒ Suggesting possible remedial measures based on the outcome of the above phase. (Parliament Questions 301107, Assam Tribune 211207)

SOCIAL – ENVIRONMENTAL ISSUES

RBI asks banks to adopt Environmental policies The Reserve Bank of India has, through a notification, asked banks to urgently adopt appropriate social & environmental policies, including the issue of emission of global warming gases and human rights. It suggested equator principles of International Finance Corporation (the private sector arm of the World Bank) as a model for policies for sustainable development in this context. The apex banks has suggested that these policies should be modified on regular basis and progress noted in the banks' annual reports. (The Financial Express 211207)

Climate change impact on Water Resources in S Asia According to the report of the Intergovernmental Panel on Climate Change released on Nov 17, South Asia will face serious water crisis due to climate change. The synthesis of its fourth assessment report says, "Glacier melt in the Himalayas is projected to increase flooding and rock avalanches from destabilized slopes and to affect water resources within the next two to three decades. This will be followed by decreased river flows as the glaciers recede... Coastal areas, especially heavily populated mega delta regions will be at the greatest risk due to increased flooding from the sea and in some mega deltas, flooding from the river." The report predicts that crop yields may decrease upto 30%. On the health front, the report predicts more diarrhea diseases due to more frequent floods and droughts in South Asia, as also in some other Asian regions. (The Tribune 191107)

Maharashtra wants to denotify Jayakwadi WLS The Maharashtra govt has decided to approach the Supreme Court for the denotification of the Jayakwadi Wildlife Sanctuary to facilitate *galpera* (draw-down) agriculture by project affected families after a discussion in the state assembly in July 2007. (Protected Area Update, Oct 2007)

IRRIGATION

National Task Force on Irrigation The Prime Minister announced at the National Development Council meeting on Dec 19, '07 that his govt has decided to set up a National Task Force to address concerns and devise a new approach to implement irrigation projects. This was following suggestions by some of the states that more funds were required for irrigation projects. The NDC meet cleared the 11th Five Year Plan, which has already been cleared by the Cabinet. (Indian Express 201207)

Bharat Nirman lagging, questionable claims The 11th Plan document claims that by March 2007 (that is in first two years of the Bharat Nirman Mission), 2,587 m ha had been added to irrigation potential out of the target of 4.3 m ha. This claim is of questionable usefulness, considering that very little of the potential created translates into actual irrigation, as far as large surface water schemes are concerned. (The Hindu 211207)

GROUND WATER

EAC asks for GW use details The meeting of the Expert Advisory Committee of the Union Ministry of Environment & Forests on Dec 10-12, '07 has asked the details of water use for the proposed 2 X 150 MW thermal power plant of Jindals at Dongamahua, District Raigarh, Chhattisgarh. Middlings from the washery & coal fines are to be used as fuel. The land requirement is 22.5 ha. The water requirement is 864 m³/hr. Among others, the Committee desired information on "Total water requirement for the project along with source wise break up i.e. mine sump water, harvested rainwater and groundwater to be furnished. A detailed water balance in this regard should also be furnished. It may clearly be indicated whether any groundwater will be drawn for the project. If so, requisite permission from the competent authority for the same." The committee will consider the proposal after this information is submitted. This is indeed a welcome move. (Minutes of the EAC meeting)

GLACIERS

Tibet Glaciers are melting The Himalayan glaciers hold about 12 000 cubic kilometers of freshwater. New evidence about Naimon'nyl, a large glacier at 6050 m altitude show that it now lacks distinctive radioactive signal that shows its depth. (Deccan Herald 191207)

RIVERS

HC questions on Yamuna for Govt The Delhi High Court has raised some very pertinent questions for the govt in view of the govt plans of buildings in the Yamuna River Bed in Delhi. Justice Gita Mittal said, "The construction is being raised in the name of national interest. But the question is whether the interest of ecology and environment would have a priority over other claims?" Another question raised is whether construction activities on the river bed and flood plains are a violation of citizens' fundamental rights to life and

the Delhi Master Plan 2021? The court also wanted to know from the govt if the existence of Akshardham Temple on the river bed gave sanctity to all constructions in the river bed. The court added that construction on the river bed would certainly damage the groundwater recharge potential. (The Times of India 221207)

2008 as River Protection Year The Rashtriya Jal Biradari has decided to celebrate 2008 as a River Protection year and decided to take up various activities to educate the society about the importance of Rivers & the threats to the existence of the rivers, including damming of rivers, building hydropower projects, river linking proposals, pollution of rivers, encroachment of riverbed and flood plains for construction, among others.

WATER POLLUTION

Punjab HC Notice to Govt on Toxic water On Dec 20, '07, the Punjab High Court issued notice to the Punjab state government, treating reports of impacts of toxic waters on people of Punjab, appearing in *The Times of India* of Dec 18, 2007 as a Public Interest Litigation. The state government has been asked to respond by January 22, 2008. The report, quoting a two year study by the Post Graduate Institute of Medical Education and Research (Chandigarh), had highlighted the impacts of industrial waste and pesticides on human health in 25 Punjab villages located near five open drains. The study found varying degrees of DNA mutation in 65% of the blood samples taken. It also detected genetic damage in some cases. The drinking water in these villages had turned toxic due to a high concentration of heavy metals such as mercury, copper, cadmium, chromium and lead. The study brought out the various health impacts on the people of the villages. (The Times of India 221207)

REVEALING QUOTES

Everything you've heard about climate change is wrong. It is much worse than people know--and every engineer should be working on it.

Nobel laureate Steven Chu, director of Lawrence Berkeley National Laboratory (Business Week 151007)

In China, agricultural growth has proven 3.5 times more effective in reducing poverty than non agricultural growth. In Latin America, it has been 2.7 times more effective. More starkly, as the *2008 World Development Report* has shown, GDP growth generated by agriculture is four times more effective in benefiting the poorest half of the population than growth in other sectors.

Lennart Bage, President, IFAD (Development Today, 131107)

We had asked for projects like the Bhakra Nangal dam here in the south. We wanted poverty to be eradicated here.

MK Karunanidhi, TN CM (The Indian Express 291007)

To my mind, PPP means private funds for public projects and not public funds for private projects as many private sector companies seem to think."

Union Minister Jairam Ramesh (The Economic Times 201207)

INTER STATE ISSUES**Hansi Butana: SC to hear on Jan 15 after CWC report**

Following request from Rajasthan Govt in hearing on Nov 12 for extension of time to put up its case before the Central Water Commission on the inter state dispute regarding Hansi Butana Canal project of Haryana, SC decided that CWC will submit the report to the Supreme Court by Dec end and the SC will hear it on January 15, 2008. At the meeting of National Development Council on Dec 19, 2007, the Haryana CM raised the issue of this link and other inter state projects.

Punjab angry with CWC The Punjab Chief Minister has come down heavily on the Central Water Commission for what he described as its "duplicity of standards on the Hansi-Butana issue. It is a paradoxical situation that the project of Sri Dasmesh Canal was stalled by CWC in case of Punjab but it never objected to Haryana's Hansi-Butana Canal for providing irrigation facilities to the areas earlier included in the SYL canal project. Surely, different yardsticks can not be applied for clearance of projects which have been framed for providing irrigation facilities to the areas under the SYL project". Terming the Hansi-Butana Canal project as totally illegal and ill-conceived Badal said that the project had inter-state implications as Bhakra Main Line canal was an interstate channel. He said that the project was started by Haryana in haste without a project report in place, without technical appraisal by CWC, without concurrence of the states of Punjab and Rajasthan and without mandatory requirement of environmental and forest clearances.

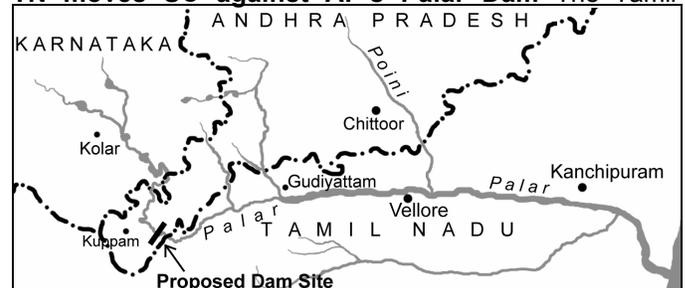
From Forest Case Update on HB Canal Before the Supreme Court appointed Central Empowered Committee the case regarding unauthorized construction of the Hansi Butana Canal inside the Saraswati Wild Life sanctuary, Haryana came up in Oct 2007. This application was filed by the Wildlife Trust of India (WTI). The sanctuary notified in 1988 is located within Kurukshetra district and is a very important habitat for the Hog Deer. The advocate of the applicant also referred to a report prepared by WTI on the issue. The application contained photographs of labourers within the sanctuary; and also those indicating digging upto 20 ft. No permission has been taken for these activities under the Wild Life Protection Act; and it also amounts to a violation of the 14.2.2000 order of the Supreme Court. The CEC observed that this is a serious violation of the Supreme Court order and questioned whether the canal has been constructed. The respondents mentioned that the work in a small portion of the sanctuary had started in July 2005. The CEC asked for the work to stop immediately. The respondents made a strong observation that the application is a sponsored litigation by the neighbouring state. The CEC clearly stated that this is not a sponsored litigation. The respondents withdrew the statement. The state govt asked for time to respond. (Forest Case Update Oct 2007, Punjabnewsline.com 011107, Indian Express, *Dainik Bhaskar* 131107, 201207)

Mullaperiyar Upon request by the Prime Minister and following initiative of Union Water Resources Minister, Kerala and Tamil Nadu Chief Ministers met in Delhi on Dec 19, '07 to discuss the Mullaperiyar Dam dispute and decided to continue the dialogue. On complain of the Kerala that there was heavy seepage of water from the dam and that TN was not allowing Kerala engineers to go to the site to assess this, the TN CM suggested at the meeting the issue of seepage from the dam should be examined by an expert body like the Central Water Commission or by engineers of other states, to which Kerala CM said he will consider the proposal and get back. TN CM contended that the seepage was within permissible limits. (Indian Express 201207)

Water Disputes in Parliament The Union Minister of state for Water Resources told the Parliament on Nov 20, 2007 that Government of Andhra Pradesh in May 2005 made complaint to the Central Government that construction of Babhali Barrage by Government of Maharashtra within the submergence area of Sri Ram Sagar Reservoir is in violation of GWDT award.

⇒ Government of Tamil Nadu also made complaint to Central Government regarding the non-implementation of certain aspects of interim order of Cauvery Water Disputes Tribunal such as monthly and weekly quantum of inflows into Mettur Reservoir in Tamil Nadu and area irrigated from Cauvery water in Karnataka.

⇒ As per Inter-State River Water Disputes Act, 1956, the decision of a Tribunal constituted under the Act after publication in the official Gazette is final and binding on parties to the dispute and is required to be given effect by them. It was amended in year 2002 whereby the decision after publication in official Gazette now has the same force as an order or decree of the Supreme Court. (PIB 201107)

TN moves SC against AP's Palar Dam The Tamil

Nadu govt has moved the Supreme Court for an early hearing of its petition to prevent Andhra Pradesh from building a dam on the Palar River. The SC has posted the case for hearing in Feb '08. AP govt is planning a dam on Palar at Kuppam near the TN border. AP contends that it is within its right to use the water of Palar as the area under the project has gone to it under the 1894 agreement. AP wants to build the dam for drinking water in Kuppam and irrigation to 1600 ha. AP contends that no environmental clearance is required for the project. The project involves some forest area and AP has applied for its clearance. (Deccan Chronicle 251107)

BHUTAN

Bhutan power to cost more The Power from the Tala, Chukkha & Kurichu Hydropower projects in Bhutan will cost more after April '08. Currently utilities are paying Rs 1.8, Rs 1.5 & Rs 1.7 per unit respectively for the power from Tala, Chukkha & Kurichu. However, these are subsidised rates as the govt of India pays Rs 2 per unit for power from Bhutan and the subsidy was borne by the Ministry of External Affairs, which has now refused to bear it. The HP projects in Bhutan are funded by the Indian govt in the ratio of 60% soft loan & 40% grant. (The Times of India 241207)

PAKISTAN

Cabinet approves Neelum Jhelum HP The Pakistan govt on Dec 13, '07 approved the 969 MW Neelum Jhelum Hydropower Project in Pakistan occupied Kashmir. The \$ 2 B project is to be built by a consortium comprising of China Gezhouba Water Power Company & the China National Machinery and Equipment Import and Export Corp in eight years. (Business Line 141207)

NEPAL

Saptakoshi opposed, DPR work stopped Following strong opposition, the work of carrying out Detailed Project Report for the proposed 3400 MW Saptakoshi Dam on Koshi River in Nepal was stopped in June '07. The opposition, lead by the Kranti Rastriya Morcha said that the authorities need to take the consent of the people to be affected by the proposed Indo Nepal Project. According to an agreement signed between the two countries in 1997, the DPR was to be completed in 30 months at a cost of Rs 30 crores. The work on the DPR could only be started in '04 and the cost of the DPR has already shot up to Rs 70 crores. (The Tribune 221207)

Pancheshwar Project stuck The Union Water Resources Minister informed the Rajya Sabha on Aug 21, '07, India-Nepal agreed, under the 1996 Mahakali Treaty, to jointly develop the Pancheshwar Project (5600 MW) on the Mahakali River. It was agreed during 11th meeting of Joint Group of Experts in March, '99 to carry out field investigations for main dam and re-regulating scheme jointly. Accordingly, a Joint Project Office-Pancheshwar was set up at Kathmandu in Dec '99 along with a field Division at Tanakpur in India and the same was closed on 31.7.'02 after completion of joint survey except for an alternate site of re-regulating structure at Rupaligad (1.7 km downstream of earlier location). The issues like location of re-regulating structure i.e. Purnagiri or Rupaligad, water availability downstream of Pancheshwar, installation, unit size & assessment of power benefits, apportionment of cost between power-irrigation & between India-Nepal are yet to be resolved for finalization of Joint DPR. These issues were discussed in the 20th meeting of the JGE in Oct '04 & it was decided to form a Joint Technical Group for such issues, which held its 1st meeting on 20-21 Dec '04. No further meetings have been held. (ESG bulletin 240807)

THE WORLD DAMS

"Reform the Army Corps of Engineers" The US Congress appears to be on track to approve a major water resources bill that would, among other provisions, reform the Army Corps of Engineers, wrote the New York Times in its editorial on July 15. It noted that both the Senate and House wanted the Corps (equivalent of India's Central Water Commission) to be reformed. And NYT wanted stronger reforms. It wrote, "Compared with most govt agencies, the corps has always lived a charmed and largely undisciplined life, accountable to no one except a Congress that is happy to let it do whatever it wants as long as it builds the dams, levees, bridges and other pork-barrel projects dear to Congressional hearts." Does it sound very familiar to India's CWC? NYT went on to write, "One result is that over the years the corps has inflated the economic payoffs of its projects while underestimating their potential damage to the environment. As the levee failures during Hurricane Katrina demonstrated, the corps has also made misjudgments in engineering and design." This again sounds similar to the CWC situation, where, to give an example, the wrong operation of the Ukai dam on Tapi river in Gujarat lead to unprecedented floods that were totally avoidable with better management of the dam. The NYT writes that the Senate addresses this by requiring independent peer review of the design, cost and environmental consequences of projects exceeding \$40 m. CWC needs even stronger reforms. (NYT 150707)

Higher siltation rate in reservoirs of Indonesia Silt deposition in reservoirs of Indonesia has been found much faster than initial projection, resulting in the need for additional loans for dredging. Documents of the Japan Bank for International Cooperation show that about 90% of the reservoir at one dam has filled with mud. But, JBIC has not disclosed data about the conditions in most cases. Bakaru Dam for hydropower generation on Sulawesi Island was designed by a Japanese consulting firm and the JBIC extended 22 billion yen in loan. The dam was completed in 1990. A projection made at the design stage predicted about 130,000 cubic meters of sediment accumulating in the lake every year. The actual figure, however, has been more than six times that at about 800,000 cubic meters. JBIC has asked the Japanese consulting firm to check more than 100 dams in the country because so many reservoirs are showing similar problems. According to the JBIC report of Dec '04, three of eight dams where mud-accumulation problems were especially serious were constructed with loans from JBIC. Of the three, Bakaru Dam was in the worst condition. About 93% of the reservoir's total volume (about 6.9 million cubic meters) is filled with sediment. Other two dams have lost 36% & 26% storage capacity. JBIC had decided to conduct more detailed study last year and found more than 6 billion yen would be needed to dredge those storages. (<http://www.yomiuri.co.jp> 140507)

THE CHINA PAGE**China's mounting water woes**

Climate Change Drying up Major Rivers The Chinese scientists have warned that rising temperatures are draining wetlands at the head of the country's two longest rivers, choking their flow and imperiling water supplies to hundreds of millions of people. Aerial photos and satellite images had shown wetlands on the frigid Qinghai-Tibet plateau, which feed the Yangtze and Yellow Rivers, had shrunk more than 10 % over the past four decades said the Chinese Academy of Sciences, a key government think-tank, "The wetlands at the origin of the Yangtze have suffered the most, contracting by 29 percent. The shrinking of the wetland on the plateau is closely connected with the global warming". Last month, CAS warned that rising temperatures could wipe out the plateau's glaciers by the end of the century, triggering more intense droughts, sandstorms and desertification across the country.

Pollution a Wide spread problem Guaranteeing water supplies to sustain its 1.3 billion people has become a major concern in China, where decades of breakneck industrialization have befouled most of the country's rivers and lakes.

- Water supplies to millions of residents have been affected in a series of algae outbreaks across the country in recent months, attributed to unusually warm and dry temperatures and pollution from farm run-off.
- On July 17, '07, an outbreak of blue algae in a reservoir has left nearly 25,000 people without water and 100,000 others with reduced supplies. The algae, in the northeastern city of Changchun, were likely caused by farm fertilisers and abnormally hot and dry weather.
- Local authorities in Changchun, capital of northeast Jilin province, are grappling with a blue-green algae outbreak that has squeezed water supplies from a reservoir feeding the city's seven million residents.
- On July 4, '07, water supplies to 200,000 people in Shuyang county, Jiangsu province, were halted for more than 40 hours after ammonia and nitrogen were found in a local river, state media reported.
- In late May, a major outbreak in Taihu lake, the country's third biggest, cut off water supplies to over 2 million residents of Wuxi city, also in Jiangsu.

China Plans wetland in Shanghai China's financial hub is planning to set aside 15 sq km of its suburbs as wetlands to improve the quality of its water, a major priority nationwide. The Qingpu district of Shanghai is planning to develop the wetlands around Dianshan Lake, the source of about 30 % of the city's drinking water, to act as a filter. The wetlands announcement comes after a string of algae outbreaks tainted drinking water supplies for millions, with a giant lake in neighbouring Jiangsu province one of the worst affected. (REUTERS 170707, 180707, 190707)

Impact of Three Gorges dam China's Three Gorges Dam, the world's largest hydropower project, is retaining huge amounts of sediment and nutrients and causing significant erosion in the downstream reaches of the Yangtze River. In a paper published in the latest volume of the Geophysical Research Letters, Chinese scientists said the dam had retained 151 million tonnes of sediment each year since 2003. The researchers from the East China Normal University in Shanghai calculated supplies of water and sediment. "The Three Gorges Dam, which has regulated the waters of the Yangtze River since 2003, retains two-thirds of the upstream sediment each year," they wrote. "Significant erosion occurs in the riverbed downstream of the dam... Sediment flux to the Yangtze river mouth has decreased by 31% per year. The Yangtze delta is shrinking." Continued sediment retention at these rates, combined with more dams planned for the watershed, will severely affect people and the ecosystems on the Yangtze delta," they added. In the past, large damming projects elsewhere have resulted in silt and nutrients being trapped behind the dams, damaging fish stocks and the fertility of downstream farmland. Many environmentalists say creation of the Three Gorges Dam will have unforeseen ecological effects apart from becoming a cesspool of sewage and industrial pollutants. The reservoir created by the dam has inundated two cities, 11 counties and 116 towns in Hubei province and neighbouring Chongqing municipality. More than 1 million people have been relocated and 1,600 factories submerged. (REUTERS NEWS SERVICE 220507)

Yunnan scraps Tiger Leaping Gorge dam The Yunnan govt has decided to scrap a plan to dam the Tiger Leaping Gorge after strong local opposition and international concern. The provincial govt reached a decision on Dec 16, 07 that no dam would be built at the gorge, one of the deepest river canyons in the world and close to a World Heritage site. Instead, authorities plan to move the dam 200 km upstream to a Tibetan-populated area bordering Weixi and Deqin counties in Diqing. The new location is expected to significantly reduce the number of people displaced. A 276 m high dam that could generate 88.3 billion kWh of electricity a year had been proposed on the Jinsha River at the gorge. The plan has been shelved since 2004 following a rare public outcry. The proposed dam was the biggest hydropower project along the Jinsha's middle reaches, and was to have been accompanied by seven smaller dams downstream. More than 100,000 residents, mostly farmers from ethnic minorities in Shangri-la and Yulong counties, would have been evicted. The new site, which had yet to be chosen from three options available, was expected to displace about 20,000 people. The proposed dam was also aimed at diverting water from the Jinsha to the centre of the province, including the provincial capital, Kunming. Villagers have welcomed the scrapping of the dam plan. (South China Morning Post. 211207)

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YOUR RESPONSES**GLACIAL DISASTERS**

As Himalayan glaciers recede (some at the rate of 30 metres per year) due to global warming, the daily glacial melt has also increased even in winter. The increased melt water does not necessarily flow down the river channel because melt water can get trapped behind natural dams caused by ice falls or moraine, causing huge lakes. There is an increased number of such lakes than in the past. There is therefore a heightened, ever-present danger of such dams bursting and suddenly releasing millions of cubic metres of water that will cause devastation even upto 100 km downstream in heavily populated areas. The bursting of such dams is possible due to a surge (wave) initiated by an avalanche into the lake, or due to water overtopping the dam, or due to water pressure on the dam, or due to an earth tremor. Identifying and monitoring such lakes by physical inspection as well as remote sensing, and constructing water release channels to lower water level and regulate water flow, should immediately form a part of disaster management at State and Central Government levels. (Disaster is defined clearly in Section 2(d) of the Disaster Management Bill, 2005). The DRDO's Snow and Avalanche Study Establishment (SASE) has decades-long expertise in this regard.

Maj Gen S.G.Vombatkere (Retd), Mysore

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