

Possible enhanced conflict situations on account of climate change on account of water sharing: A case study of three states of India

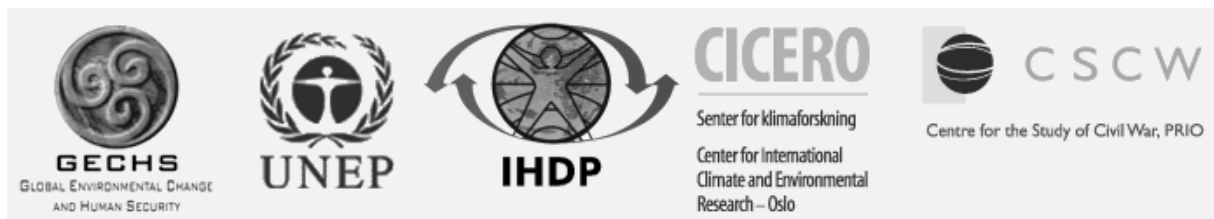
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Possible enhanced conflict situations on account of climate change on account of water sharing: A case study of three states of India

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Abstract

With the political independence and federal government in place, various resources have been divided into groups to be governed by the either federal or state governments. Water as subject was given to the state. Thus, all water resources in the state have come to be governed by the respective state government and interstate water resources sharing like river waters followed according the sharing practices during the time of independence. Similarly, the southern three states of India, viz. Andhra Pradesh, Karnataka and Tamil Nadu entered into agreement of sharing water related to River Krishna (between first two states) and River Cauvery (between last two states and the original agreement on sharing can traced back to 1892) agreed upon the sharing of waters based on the then irrigational development and requirement and was followed till now despite several tribunals to solve the problem of water sharing.

Most of the agriculture in these three states depends on the monsoon. In the event of normal monsoon, there are no problems in water sharing between these states, but in the event of non-normal-monsoon, the problem of water sharing becomes acute with many instances of violent confrontation beginning from 90s, resulting in heavy property and life loss in these states (more particularly between Karnataka and Tamil Nadu). Further, the water sharing became a perennial political issue to be often raised by the political parties in all these three states to gain electoral benefits.

On the other hand, IPCC has projected that on account of global climate change, there will be more precipitation with a deviation up to 5% under various GCMs. In the event of increased precipitation in shorter duration, these states should be in a position to capture the excess runoff

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to meet its agricultural (largest population still depends on agriculture) domestic and industrial purposes.

But going by the recent past and present thinking at both community and State level, any plans to undertake any water storage and development project activity by any of the state will result in conflict situation with other state with a most probable net result of making huge chunk of marginal and small farmers to be affected significantly in addition to the marginal groups who are vulnerable in conflict situations.

But, In the whole process, there appears to be little or no studies based on the regional scale to adapt to the imminent climate change and its possible mitigation measures so minimize the adverse impact. In this doctrinal paper, we shall make a present a detailed case on how the predicted climate change with present state of affairs would enhance the conflict situation.

It is not without significance that the word rival is derived from rivus, a stream.
– H M Seervai (legendary constitutional law expert)

Introduction

India is the largest practicing democracy in the world. The Constitution is federal in structure and lays down the division of power between the Centre and the States with New Delhi as the capital of the Republic. It is a country of social contrasts and enormous ethnic, linguistic and cultural diversity. The States vary in size from the gigantic Uttar Pradesh with almost 150 million people to tiny Sikkim. The principle of division is mainly along linguistic lines. The Indian sub-continent has an area of 3.28 million sq. km (329 million hectares), second largest country in Asia and seventh in the world. It measures 3,214 km from north to south and 2,933 km from east to west, with a total area of 3,287,263 sq. km. The land frontier is 15,200 km and the coastline is 7,516.5 km. It lies within the latitude of 8 degrees North in the extreme south and 37 degrees in the North, providing adequate sunshine throughout the year in most regions. The rainfall distribution is very uneven. The southwest monsoon accounts for almost all the rain in 75% of the geographical area and 78% of the gross cropped area. The annual rainfall averages 1,170 mm. About a third of the cropped area is still rainfed. More than 61 million hectares receive the benefit of irrigation by exploiting groundwater. The three seasons of the sub-continent are winter (December-February), summer (March-May), and monsoon (southwest monsoon from June to September, and northeast monsoon from October-November). India is a land of small farm holders. The average size of operational farm holding is about 1.18 hectares. Of the total 329 million hectares, 124.58 million hectares are devoted to raising food crops to provide food security for the country. Though the share of agro exports is coming down, significant portion of the population still depends on either farm or non-farm activities. Thus, the monsoon plays a very important role in national economy and well being of its population and India has reasons to be concerned about the impacts of climate change. Its large population depends on climate-sensitive sectors like agriculture and forestry for livelihoods. Any adverse impact on water availability due to decrease in rainfall or increased flooding in certain pockets would threaten food security and increase vulnerability and livelihoods of rural households, and adversely impact the coastal system due to sea level rise and increased frequency.

Various climate projections have showed that there is significant increase of the order of 0.4°C in the past one hundred years in the annual global average surface air temperature. While annual average monsoon rainfall at the all-India level for the same period has been without any trend and variations have been random in nature, increase in monsoon seasonal rainfall have been recorded along the west coast, north Andhra Pradesh and north-west India (+10 to +12 per cent of normal/100 years). Projections of seasonal surface air temperature for the period 2041-60, based on the regional climate model HadRM2. decreasing trends have been observed over east Madhya Pradesh and adjoining areas, north-east India and parts of Gujarat and Kerala (-6 to -8 per cent of normal/100 years).

Using the second generation Hadley Center Regional Model (Had RM2) and the IS92a future scenarios of increased greenhouse gas concentrations, marked increase in seasonal surface air temperature is projected into the 21st century, becoming conspicuous after the 2040s Climate projections indicate increases in both maximum as well as minimum temperatures over the region south of 25°N, the maximum temperature is projected to increase by 2-4°C during the 2050s. In the northern region the increase in maximum temperature may exceed 4°C. Model projections also indicate an increase in minimum temperature by 4°C as per projections of seasonal precipitation for the period 2041-60, based on the regional climate model HadRM2. all over the country, which may increase further in the southern peninsula. Little change in monsoon rainfall is projected up to the 2050s at the all-India scale level. However there is an overall decrease in the number of rainfall days over a major part of the country. This decrease is greater in the western and central parts (by more than 15 days) while near the Himalayan foothills (Uttaranchal) and in northeast India the number of rainfall days may increase by 5-10 days. Increase in rainfall intensity by 1-4 mm/day is expected all over India, except for small areas in northwest India where the rainfall intensities may decrease by 1 mm/day.

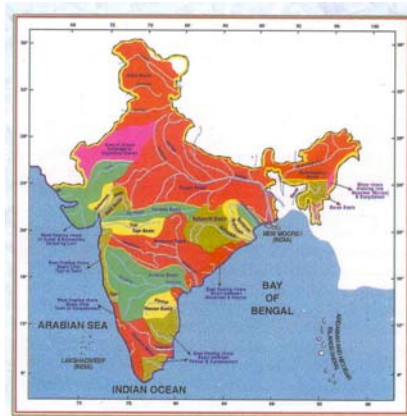


Fig. 1: Major River Basins of India

Assessment of the projections of future climate by different GCMs show a consistent rise in temperature across all models, indicating that these predictions are robust. However, the projections of rainfall vary across models. Though the climate models used for assessing future climate have their inherent limitations and uncertainties, the results obtained through these models give an indication of the likely changes in climate in the future. The consequences of these expected changes would vary greatly across the length and breadth of India due to its complex geography and climate patterns. However, with the present state of affairs, an attempt is made to examine the vulnerability on account of the climate change in South Indian River basins.

South India comprising of five states, Andhra Pradesh, Karnataka, Kerala, Pondicheery and Tamil Nadu is well irrigated by several rivers of which Krishna, Godavari and Cauvery are the major rivers. Here, the rivers of Cauvery and Krishna were subjected to detailed examination.

Cauvery River Basin

Cauvery Basin extends over an area of 87,900 km² which is nearly 2.7% of total geographical area of the country. The basin lies in the states of Tamil Nadu (48,730 km²), Karnataka (36,240 km²) and Kerala (2,930 km²) (Fig. 2). Cauvery river rises at Talakaveri on the Brahmagiri range in the Western Ghats in Karnataka at an elevation of about 1341 m and flows for about 800 km before its outfall into the Bay of Bengal. The important tributaries joining the Cauvery are the Harangi, the Hemavati, the Kabini, the Suvarnavathi and the Bhavani. Physiographically, the basin can be divided into three parts - the Western Ghats, the Plateau of Mysore and the Delta.

The delta area is the most fertile tract in the basin. The principal soil types found in the basin are black soils, red soils, laterites, alluvial soils, forest soils and mixed soils. Red soils occupy large areas in the basin. Alluvial soils are found in the delta areas. An average annual surface water potential of 21.4 km³ has been assessed in this basin. Out of this, 19.0 km³ is utilizable water. Culturable area in the basin is about 5.8 Million ha, which is 3.0% of the total culturable area of the country. Present use of surface water in the basin is 18.0 km³. Live storage capacity in the basin has increased significantly since independence. From just about 4.1 km³ in the pre-plan period, the total live storage capacity of the completed projects has increased to 7.4 km³. In addition, a storage quantity of over 0.3 km³ would be created on completion of projects under construction. An additional storage to the tune of over 0.3 km³ would become available on execution of projects under consideration. The hydropower potential of the basin has been assessed as 1359 MW at 60% load factor.



Fig. 2: Cauvery River Basin

Importance of Cauvery to Karnataka

This state is considered the economic power of southern India. Bangalore, its capital city, is the fastest growing city in India. Growing high tech sectors are centered in Bangalore such as pharmaceutical and chemical industries. Due to the "industry friendly" atmosphere in Karnataka, major international firms are finding it a beneficial location for business. International firms in Karnataka include Hewlett-Packard, IBM, Kentucky Fried Chicken, and Cargill Corporation. This industrialization is not without consequence for Karnataka. These firms and industry sectors require a mass amount of water; water that is scarce in this region. In times of weak monsoons,

the fragile water situation in Southern India is exposed. In order to preserve the industrial growth and protect commercial use in Karnataka, local officials ration water to citizens on a rotational basis.

Importance of Cauvery to Tamil Nadu

While temples are the main attraction to Tamil Nadu, agriculture is the primary means of sustenance. Tamil Nadu relies on the Cauvery River to sustain its agricultural needs. Beyond the Cauvery, Tamil Nadu has very few resources for complex irrigation systems to maintain its water supply. Cauvery is the lifeblood of Tamil Nadu's agriculture, and agriculture is the lifeblood of Tamil Nadu. It is mandatory for Karnataka to abide by the decisions made by the Tribunal and Supreme Court. Karnataka is not above the law, and should be made to release at least 205 TMC of water to Tamil Nadu to save standing crops. Tamil Nadu asserts that water sharing is a national issue that requires the intervention of the Government of India.

Sharing of Cauvery waters

Historical Background

The erstwhile state of Mysore was constituted under Article 4 of the Mysore Partition Treaty of 1799, which came about after British-led forces defeated Tippu Sultan at Srirangapatnam, (near Mysore city). Afterwards, it came to notice of the British officials then that irrigation in the entire Cauvery region was confined to the tank system that needed repairs. However, efforts to repair them were met with protests in the Tanjore district of the Madras presidency, even though there was no major obstruction to the flow of the Cauvery. This led to the first discord over sharing the Cauvery water took place in 1807, when the then British resident of Mysore rejected the Tanjore (now Thanjavur) collector's claim that constructions of bunds in the then princely state had led to a decline of water flow. Later, the 1892 agreement between Madras and Mysore stipulated that the latter could not take up new irrigation projects without the former's prior approval, while the second agreement in 1924 envisaged a 50-year fresh agreement which upheld the claims of Madras for a larger share of the Cauvery water. In 1914, "Sir H D Griffin (a former Allahabad high court judge who was asked to arbitrate between Madras and Mysore over the

sharing of the Cauvery water) favoured Mysore. Madras then appealed to the Secretary of State in Britain who, three years later, set aside Griffin award by exercising his paramount power, an extra-legal power. "Consequently, the princely state of Mysore had to surrender its legitimate and equitable share in the waters of Cauvery on account of its subordinate position as a vassal state... and it has forced Mysore to part with "more than 80 per cent of the natural flow of Cauvery water to the Madras presidency, by 1974, Tamil Nadu had "illegally developed" land under irrigation up to 2.8 million acres in comparison to Karnataka's 680,000 acres in the Cauvery basin⁴".

Tamil Nadu does not control any of the Cauvery headwaters, yet it is in possession of the tributaries Bhavana and the Moyar. There is peace in times of good rains. However, when the monsoons fail, violence erupts, from streets of Karnataka and Tamil Nadu to Delhi. Since 1974 when a 50 year old agreement between the Madras presidency and the princely Mysore state collapsed, the Cauvery River Dispute has been a serious issue. Another draft agreement was prepared in 1976 but was not adopted in spite of its announcement on the floors of Parliament because Tamil Nadu backed out of the agreement and then Karnataka followed suit.. On account of erratic compliance of the agreement of water sharing, Government of Tamil Nadu has approached the highest judiciary of India – Supreme Court.

Table 1: Annual rainfall (mm)-Cauvery districts and Karnataka average:1991-2002

Year	Kodagu	Hassan	Tumkur	Bangalore U	Bangalore R	Kolar	Mysore	Mandya	State
1991	2627	1272	911	1377	1210	1027	901	882	1251
1992	2942	1503	647	687	835	730	794	649	1333
1993	2156	999	728	941	982	813	731	730	1123
1994	3379	1322	614	654	678	590	957	690	1229
1995	2686	1196	516	661	673	645	663	616	1219
1996	2997	1272	684	787	873	834	911	844	1325

⁴ H.K. Patil, Former Minister for Water Resource, Government of Karnataka

1997	3358	1585	624	799	828	631	875	826	1490
1998	2826	1258	727	934	1092	776	791	708	1479
1999	2939	1436	651	964	998	573	912	815	1431
2000	2835	1417	785	1053	954	788	955	898	1422
2001	2557	1206	618	723	797	802	743	691	1194
2002	2118	732	521	471	657	478	586	483	863
Mean	2785	1266	667	838	881	724	818	736	1280
SD	393.8	229.2	109.9	236.0	172.9	148.0	119.9	122.3	177.0
Mean/SD	7.1	5.5	6.1	3.5	5.1	4.9	6.8	6.0	7.2

Source: Department of Agriculture, Government of Karnataka.

Table 2: Annual rainfall (mm)-Cauvery districts and Tamil Nadu average: 1997-2002

1997-98	1998-99		1999-2000	2001-2002		Mean	SD	Mean/SD	
Total in the year	Total in the year		Total in the year	SW mon-soon	NE mon-soon	Total in the year			
Erode	820	704	632	170	255	500	664	134.0	5.0
Salem	973	1194	1020	397	199	698	971	205.5	4.7
Namakkal	973	766	724	260	165	490	738	198.1	3.7
Karur	820	544	674	63	194	313	588	215.1	2.7
Tiruchy	820	822	751	198	243	552	736	127.2	5.8
Perambalur	820	1107	730	147	344	606	816	213.1	3.8
Tanjavur	1267	1111	942	264	450	989	1077	145.2	7.4
Tiruvarur	1813	1413	1275	213	463	973	1369	348.7	3.9
Naga-pattinam	1813	1470	1431	258	818	1447	1540	182.5	8.4
State average	1152	1080	897	260	379	795	981	164.0	6.0

Source: Data for years 1997 – 2000 from Government of Tamil Nadu, 2000; data for 2001-2002 from Government of Tamil Nadu, 2002.

There is a widespread feeling in Karnataka that the 1924 agreement had meted out a historical injustice to the state under which the interests of the state had been subordinated to the interests of the then Madras Presidency under British rule. In the changed situation after the formation of the new state, Karnataka therefore wanted to undo the ‘historical injustice’ meted out to the state in the British period and rewrite the ‘previous agreement between unequal partners’ on a new

basis of strength and parity. There is a strong feeling in the state that as a late starter it has to do a lot of catching up on the agricultural front, especially in the sphere of irrigation, and therefore it should enjoy guaranteed and undiminished rights over the waters of Cauvery.

Tamil Nadu, on the other hand, has grown ever more dependent on the Cauvery for its water requirements. The state has nearly doubled its irrigation potential from the pre-Mettur command area of 14.4 lakh acres to 25.8 lakh acres in the subsequent plan periods. As a lower riparian state, Tamil Nadu feels threatened because any decline in the flow of Cauvery waters to the state can prove disastrous for its framework of irrigated agriculture. Indeed, the inflow into the state has been diminishing, because of upstream development, on the one hand, and because of less inflow to the reservoirs in the upper riparian state, on the other. Tamil Nadu therefore insists on a clear recognition of past agreements and on the principle of prescriptive rights arising from prior use.

Here is the position of both the State's Government on Cauvery Issue

Karnataka's Position:

When the failed monsoons had created severe drought situations in much of Karnataka, the reservoirs of the Cauvery Basin only reached 23.2 TMC feet of water. The total requirement for Karnataka in 1994 was 24 TMC of water. Therefore, Southern Karnataka and Bangalore City are short of drinking water. If Karnataka had to release water to Tamil Nadu it would be at the expense of Karnataka's economic growth and its own citizenry.

Tamil Nadu's Position:

Tamil Nadu depends on agriculture as the primary means of sustenance. It relies on the Cauvery River to sustain its agricultural needs. Beyond the Cauvery, Tamil Nadu has very few resources for complex irrigation systems to maintain its water supply. It is mandatory for Karnataka to abide by the decisions made by the Tribunal and Supreme Court. Karnataka is not above the law, and should be made to release at least 205 TMC of water to Tamil Nadu to save standing crops. Tamil Nadu asserts that water sharing is a national issue that requires the intervention of the

Government of India. Tamil Nadu is now shifting its case from the Supreme Court and Tribunal to the Parliament.

In April 1991, the Supreme Court of the Government of India reassigned a tribunal to settle the dispute as mandated in the Inter-State River Water Disputes Act. The Tribunal heard arguments from both states as claimed by basin States in the Tribunal is as under :-

- a) Karnataka - 465 TMC ft.
- b) Tamil Nadu - Flows to be ensured in accordance with the terms of the agreements of 1892 and 1924.
- c) Kerala - 99.8 TMC ft.
- d) Union Territory of Pondicherry - 9.3 TMC ft.

but resolved that Karnataka must release 205 TMC of water from the Cauvery reservoirs to Tamil Nadu on a monthly basis. However Karnataka declined to accept the ruling of the Tribunal. The Government of Karnataka argued that the Tribunal issued a decision that was not implementable. Due to failed monsoons, many parts of Karnataka were left without adequate water supplies. If the government were to release more than 100 TMC of water to Tamil Nadu, then it would be at the cost of its own people. The rejection of the Tribunal's decision pushed the negotiations on a downward spiraling path that eventually led to aborted talks.

However in 1995, the monsoons failed to fill the Cauvery tributaries possessed by Tamil Nadu. On January 1, 1996, Prime Minister asked Karnataka to release an immediate six tmcft (one thousand million cubic feet) of water to Tamil Nadu to save the standing crops, resulting in the violent protests.

The centre of the agitation, this time, has been not so much Bangalore as Mysore and Mandya. Not a single day has been passing without any demonstration, at K.R.Circle in Mysore, by some section or the other since 4 September 2002. Right from the workers of BEL and Vikrant Tyres to doctors and engineers, from platform vendors to Brahamana Sangha, people from all walks of life have taken to the streets in support of the agitating farmers and it has been spontaneous. Be it Deve Gowda or S.M.Krishna, the leaders have had to jump in to capture the mass sentiments and retain their grip on the mass politics in their strongholds of Mandya and Mysore districts. Both

these leaders undertook padyatras on the issue but both had to abandon their 'yatras' mid way fearing the fury of farmers.

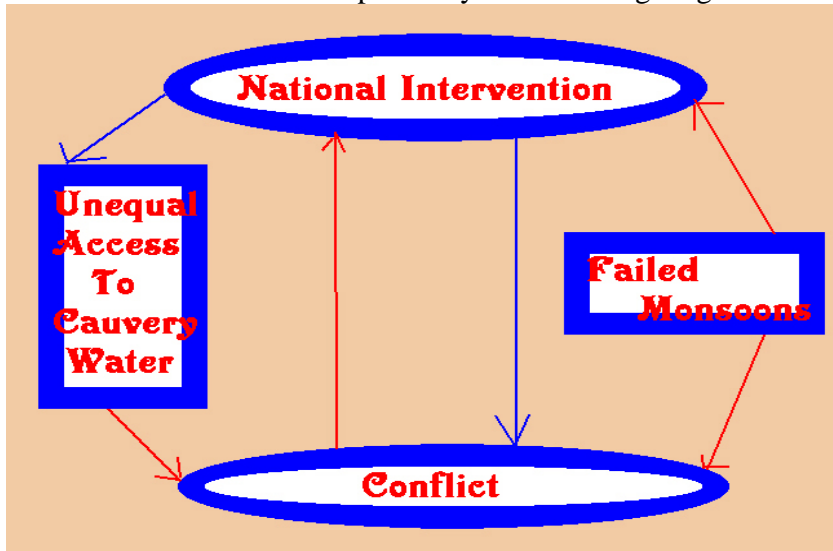
The situation in Tamil Nadu has been no less explosive. Apart from the delta farmers and different political parties and the state government, people associated with the Tamil film world have also been quite vocal in protests. While many film stars gathered at Niyaveli to demand cessation of supply of power from the Niyaveli plant to Karnataka, superstar Rajni Kant observed a day's hunger strike in Chennai and called for an amicable solution between the two states.

It is not for nothing that the people are up in arms in both states. Tamil Nadu has lost its kuruvai crop. Farmers are looking forward to the Mettur dam to be opened for Samba cultivation. On the other hand, the South West monsoon has failed in Karnataka. Farmers are in an acute state of agony to save their standing crops as no other monsoon is expected. So, they want the available water in the reservoirs to be used for saving the standing crops. The suffering of the farmers of both states is genuine. The problem arose primarily because of lack of sufficient rainfall. The reservoirs in Karnataka have received water measuring only 50% of what it received in the corresponding period last year. The problem has been aggravated by the complete lack of warning issued by the two state governments to the farmers and the latter have therefore been in no position to make any kind of cropping adjustment.

It was against this background that the Supreme Court order directing Karnataka to release 1.25 tmcft of water every day to Mettur dam triggered the spate of agitations in the delta region. The Cauvery River Authority meeting on September 8 reduced the quantum to 0.8 tmcft every day. But, under pressure of agitating farmers, water was not released even as per the CRA's decision. The state government did start releasing water from September 14 but it had to be stopped on September 18 when a farmer from H.D.Kote taluk drowned in Kabini river protesting the release of water. Perhaps, this is the first time people heard of such an incident in Karnataka whereas such things have been fairly common in Tamil Nadu although not on the Cauvery issue.

Instead of addressing it as a question of lack of sufficient water in the first place, if it is treated as a mere question of non-implementation of verdicts given by various judicial bodies, we will end up nowhere and the real issue cannot be addressed squarely.

The turn of events can be captured by the following diagram



River Krishna Basin

Krishna Basin extends over an area of 258,948 km² which is nearly 8% of total geographical area of the country. The basin lies in the states of Karnataka (113,271 km²), Andhra Pradesh (76,252 km²) and Maharashtra (69,425 km²). Krishna river rises in the Western Ghats at an elevation of about 1337 m just north of Mahabaleshwar, about 64 km from the Arabian Sea and flows for about 1400 km and outfalls into the Bay of Bengal. The principal tributaries joining Krishna are the Ghataprabha, the Malaprabha, the Bhima, the Tungabhadra and the Musi. (Fig. 3)

Most part of this basin comprises rolling and undulating country except the western border which is formed by an unbroken line of ranges of the Western Ghats. The important soil types found in the basin are black soils, red soils, laterite and lateritic soils, alluvium, mixed soils, red and black soils and saline and alkaline soils. An average annual surface water potential of 78.1 km³ has been assessed in this basin. Out of this, 58.0 km³ is utilisable water. Culturable area in the basin is about 20.3 Million ha, which is 10.4% of the total culturable area of the country. Present use of surface water in the basin is 50.0 km³. Live storage capacity in the basin has increased

significantly since independence. From just about 3.2 km³ in the pre-plan period, the total live storage capacity of the completed projects has increased to 34.5 km³. In addition, a substantial storage quantity of over 4.9 km³ would be created on completion of projects under construction. An additional storage to the tune of over 0.1 km³ would become available on execution of projects under consideration. The hydropower potential of the basin has been assessed as 2997 MW at 60% load factor.



Fig. 3: Krishna River Basin

Sharing of Krishna waters⁰

Krishna Water Disputes Tribunal headed by Justice Bachawat was constituted in April, 1969 for adjudication of Inter-State Water Dispute regarding sharing of Krishna Waters.

* Award of the Tribunal:

The Tribunal gave its award in 1976. As per this award 75% dependable flow of Krishna Water upto Vijaywada was assessed as 2060 Thousand Million Cubic Feet (TMC) which was allocated as below :-

State	Flow
Maharashtra	560 TMC
Karnataka	700 TMC
Andhra Pradesh	800 TMC

In addition, the above States were allowed to use return flows to the extent of 25, 34 and 11 TMC respectively. Further it gave liberty to Andhra Pradesh to use in any water year any excess flows that may be available without conferring any right whatsoever in the matter. The Tribunal has allowed the States to utilise their allocated share of water for any project as per their plans.

* Scheme A & Scheme B of the Award.

The Tribunal in its report has discussed about two schemes namely, Scheme "A" and Scheme "B". However in its Final Award, the Tribunal has mentioned only about the Scheme "A". In the Tribunal's report, it has been mentioned that Scheme "B" can be implemented if all the three States agree. There is also provision of setting up of Krishna Valley Authority under Scheme "B". Scheme "B" also specifies allocation of surplus water amongst three States.

Review of the Award

The Tribunal Award can be reviewed by a competent Authority or a Tribunal on any date after 31st May, 2000 without disturbing any utilisation undertaken by the States within the limits of their allocated shares.

Dispute regarding Upper Krishna & other projects

The Government of Andhra Pradesh has intimated that the Government of Karnataka is constructing Almatti Dam with a height more than what had been approved by the Union Government. In this connection, it is mentioned that the Government of Karnataka proposes to construct Upper Krishna Project (Almatti Dam is a part of Upper Krishna Project) in two stages. The Stage-I of the Upper Krishna Project has been given investment clearance by the Central Government. However, Stage-II of the project which envisages construction of the Almatti Dam to a height of 528 m. is yet to be given investment clearance by the Central Government and a frequent point of discussion for the political parties.

Thus, on one hand there is fight between interstate water sharing, on the other hand, political leaders are staging public dharnas and sitting on hunger strikes demanding release of Krishna water for their respective regions in intrastate water use in Andhra Pradesh. . Politicians from

Rayalaseema region demanded that water from Srisailem reservoir be released to Nagarjuna Sagar only after the irrigation needs of Rayalaseema are met. Politicians from coastal Andhra region were demanding timely release of water from Nagarjuna Sagar reservoir to save their crops, which is being opposed by politicians from Telengana region. If these were tussles going on within the state between various regions, inter-basin states AP, Tamil Nadu and Karnataka were fighting on how to share Krishna and Cauvery waters.

Thus, it becomes clear that most of the efforts and attempts made so far are very shortsighted.

Vulnerability

Definitions of Vulnerability, Adaptability and Adaptive Capacity⁵

- Vulnerability is the degree to which a system will respond to a given change in climate, including beneficial and harmful effects (IPCC Working Group II, 2001).
- Vulnerability is the degree to which a system is susceptible to or unable to cope with, adverse effects of climate change including climate variability and extremes.
- Vulnerability is also a function of the character, magnitude and rate of climate change and variation to which a system is exposed, its sensitivity and its adaptive capacity [Summary for Policy Makers (IPCC Working Group II)].
- Adaptability refers to the degree to which adjustments are possible in practices, processes, structures of systems to projected or actual changes of climate. Adaptation can be spontaneous, or planned, and can be carried out in response to or in anticipation of changes in conditions (IPCC, 1996).
- Adaptive capacity is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities or to cope with the consequences

While there are many facets to the complex issue of water sharing, a few fundamental and natural facts are universally recognized: a) Water flows only downhill; b) Water does not recognize artificial, political boundaries. Apart from these self-evident facts, fundamental policy issues on how scarce water resources shall be utilized have to be recognized. World over it is widely accepted that the priorities for water usage will be first for drinking water, second for industrial consumption and third for agricultural use. Irrespective of the fact that some of us may not like agriculture being given the last priority, in the modern industrial economy, this order of

⁵ [Summary for Policy Makers (IPCC Working Group II)].

priority came to be widely accepted. Accordingly, There are certain doctrines that govern laws of sharing river waters all over the world viz., (1) Doctrine of Riparian Rights (2) Doctrine of Prior Appropriation (3) Doctrine of Territorial Sovereignty (Harmon Doctrine) (4) Doctrine of Community of Interest, and (5) Doctrine of Equitable Apportionment.

The Doctrine of Riparian Rights is basically a doctrine governing the sharing of river water of two different countries. According to the Doctrine of Community of Interest, a river passing through several States is one unit and should be treated, as such, for securing the maximum utilization of its waters. This doctrine, if properly applied, can secure integrated development. Its smooth implementation however requires a high degree of mutual agreement. The Kosi project (India and Nepal) is often cited as an example that depends upon such an approach.

The Doctrine of Territorial Sovereignty (Harmon Doctrine) is the one adopted in case of rivers flowing from USA to Mexico. It was evolved by Attorney General Harmon, of the US in 1896, to justify the action of the United States in reducing the flow of the river Rio Grande into Mexico. Perhaps, this is the doctrine preferred by Karnataka even if it is not spelt out in so many words. Tamil Nadu, on the other hand, insists on the Doctrine of Prior Appropriation so as to protect its historical interests. It is this doctrine that protects the rights of lower riparian states when there is an expansion of irrigation in the upper riparian states. And the doctrine that apparently finds favour with the tribunal is that of Equitable Apportionment.

In theory, the Doctrine of Equitable Apportionment seems to be the best doctrine to govern the sharing of river waters flowing through different states in a single country. But since the concept does not lend itself to precise formulations and it cannot be translated into a fixed code that can be applied to all situations and at all times, it leaves the lower riparian regions in a state of uncertainty about the actual quantum flow of water. This is why we see lingering disputes every month and year, particularly in the lean periods of the monsoon. But, this is the theory that makes the river common to all states in the river basin and advocates equitable distribution of both benefits and distress.

This is the theory accepted in India for sharing river waters and the need of the hour is to remove the vagueness that surrounds it by evolving an effective formula of sharing on a scientific basis.

Treating this issue either as a matter of bargaining as seen in the case of the verdicts given by the Supreme Court or the CRA, or as an absolute prerogative of Karnataka which denies Tamil Nadu farmers their due share farmers, or as a matter of protecting the rights that have accrued to Tamil Nadu through 'prior appropriation' – any of these three approaches will inevitably lead to prolonged never-ending disputes. The moot point is to evolve a dynamic, scientific distress-sharing formula that can make allowance for even the worst monsoon situations.

Both the positions are untenable in the changed context and there is a need for a fresh approach. Karnataka should realize that Tamil Nadu is a co-riparian state and releasing water to Tamil Nadu from the common river is not out of some charity. On their part, Tamil Nadu and Andhra should also recognize the growth needs of Karnataka and realise that there can be no return to the 1924 or 1973 position respectively. They should also lay greater stress on a more economic usage of water, conjunctive use of ground water and surface water and conservation of water, etc.

The new approach should revolve around a scientific and dynamic distress sharing formula. It should also pay adequate attention to the following aspects: (i) Exploring new, alternative methods of irrigation that can better cater to the needs of farming communities at local level by providing irrigation facilities to a cluster of fields involving say 50-100 farmers, (ii) Experimenting with alternative cropping patterns based on crop varieties that need less water, (iii) Setting up an independent River Water Authority and entrusting it with the responsibility of forewarning the farmers about the potential water availability, (iv) Formulating an appropriate National Water Policy that can effectively deal with such crisis situations, (v) Exploring the possibility of networking of rivers at least at the level of South India.

The present confrontation over Cauvery and Krishna waters has to be seen in the context of the deepening agrarian crisis. With the farmers already suffering from lack of minimum support price for their produce and skyrocketing prices of inputs, including electricity and water thanks to privatization, the failure of monsoons has come as the proverbial last straw on the camel's back. Behind the general plight of the farmers and its intensification in the wake of the Cauvery and Krishna crisis lies the criminal policies and callous role of the four concerned governments viz. government at the Centre to the government of Karnataka, government of Andhra Pradesh

and the regime in Tamil Nadu. It is the new economic and agricultural policies of these governments which have really endangered the livelihood of millions of farmers and agrarian labourers. Yet it is the same governments and the parties which are also desperately trying to misappropriate and mislead the genuine resentment of the farmers by whipping up narrow sectarian passions.

As is always the case, the small and marginal peasants and agrarian labourers are forced to bear the biggest brunt of the Cauvery crisis. But in most discussions on the subject, the least attention is paid to their plight. Any acceptable solution to the Cauvery crisis must include measures like special employment generation programmes for the rural poor and provision of adequate food and other necessities for the crisis-ridden population.

Clearly, the need of the hour is not to allow vested interests to play mischief with the crisis by pitting the farmers and general public of one state against their counterparts in the other state and instead put up a united fight for an amicable solution that revolves around reduction of misery and equitable sharing of distress. We must remember that the rivers are not a piece of private property but a common property of the people of all its basin states, Andhra Pradesh, Karnataka, Tamil Nadu, Kerala and Pondyichery. Also, the struggle needs to be carried forward against the architects of not just the Cauvery water crisis but the larger agrarian crisis that is transforming agriculture into a killer occupation where peasants can only sow distress and harvest death, with global climate change looming large, the need of the hour is how best to equip ourselves to save precious water from wastage to tide away the non-normal monsoon years. Further, equally important is creating awareness among the farming community regarding the cropping pattern. For instance, the Tunga Reservoir over River Tunga was primarily meant for bringing the dry lands into wet irrigation. However, over the years, the farming community has shifted over to the irrigation of water intensive crops like Sugarcane which has resulted in increased demand for the water within the control area of the reservoir, which has ultimately led to the tension regarding the release of water from the reservoir as it affects the farmers most of whom are marginal in nature.

Further, with no single political party able to form government at federal level, association with regional political parties became a reality. Thus, the asymmetry of circumstances makes it difficult to come to any understanding.

Table 1: Asymmetry- Six possible situations for river water disputes⁶

	Federal government is <i>Strong</i>	Federal government is <i>Weak</i>
Both riparian states are weak	<i>Case A</i> Minimal scope for dispute: federal government can coerce agreement	<i>Case B</i> River water sharing agreement, if any, is likely to remain a short-term and informal arrangement.
Powerful state is the upstream riparian	<i>Case C</i> River dispute arises if federal government intervenes on behalf of the downstream riparian	<i>Case D</i> No river dispute: Agreement will be determined by upstream riparian
Powerful state is the downstream riparian	<i>Case E</i> River dispute arises if federal government intervenes on behalf of the downstream state	<i>Case F</i> There is scope for self-enforcing agreement between the two riparians

Thus, in view of impending climatic changes, need of the hour is to explore the best possible means to face the worst possible scenario. This can be achieved only by overcoming the petty political gains for the larger interest of the nation and not stressing on the absolute quantum of water.

⁶ P.B. Anand. WATER AND IDENTITY: AN ANALYSIS OF THE CAUVERY RIVER WATER DISPUTE BCID Research Paper 3, 2002

References

Achanta, A N (1993): 'An Assessment of the Potential Impact of Global Warming On Indian Rice Production' in A N Achanta (ed), *The Climate Change Agenda: An Indian Perspective*, Tata Energy Research Institute, New Delhi.

Anand P.B., 2001, Water 'Scarcity' in Chennai, India: Institutions, Entitlements and Aspects of Inequality, Discussion Paper number 140, UNU-WIDER Discussion Papers Series, Helsinki: The United Nations University, World Institute for Development Economics Research (available from URL <http://www.wider.unu.edu/publications>)

Arnold D., 1984, Famine in Peasant Consciousness and Peasant Action: Madras, 1876-8, chapter in R. Guha (ed), *Subaltern Studies: Writings on South Asian History and Society*,

Jeyarajan J., 1998, Cauvery dispute: Changing paradigms, *Economic and Political Weekly*, 33,46, 2000-01.

Gosain, A K and Sandhya Rao (2003): *Impacts of Climate Change on Water Sector* in Shukla et al, op cit, pp 159-92.

Gupta, Vijaya (2003): 'Global Climate Change: India's Local Concerns', (2001): *Climate Change: Impacts, Adaptation and Vulnerability*, Third Assessment Report of Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK.

Government of India, 2001, Monthly Summary for the Cabinet for July 2001 –Unclassified, Ministry of Water Resources, Delhi: Government of India.

Government of India, 2003, The Economic Survey: 2002-2003, Ministry of Finance, New Delhi: Government of India.

Government of Karnataka, n.d., Cauvery Water Dispute: Saga of a century old thirst for water, Bangalore: Irrigation Department.

Government of Karnataka, 2002a, Cauvery water dispute: People's struggle for rightful share, Bangalore: Water Resource Department.

Government of Karnataka, 2002b, State Water Policy, Bangalore: Government of Karnataka.

Government of Karnataka, 2003, Cauvery water dispute: People's struggle for rightful share, volume 2, Bangalore: Water Resource Department.

Government of Tamil Nadu, 1983, Krishna Water Supply Project for Madras, Madras: Government of Tamil Nadu.

Government of Tamil Nadu, 2000, Tamil Nadu: Season and Crop Report, available from <<http://www.tn.gov.in/crop/index.htm>>

Menon P., 2003, Death and distress, Frontline, 20,24, available from URL <<http://www.frontlineonnet.com/fl2024/stories/20031205002603700.htm>>

Richards A. and Singh N., 2002, Inter-state water disputes in India: Institutions and policies, International Journal of Water Resources Development, 18,4, 611-25.

Kumar, K R, K K Kumar, V Prasanna, K Kamala, N R Deshpande, S K Patwardhan and G B Pant (2003): *Future Climate Scenario* in Shukla et al, op cit, pp 69-127.

Ravindranath, N H and R Sukumar (1998): 'Climate Change and Tropical Forests in India', *Climatic Change*, 39(2-3), pp 563-81.

Annexure I: Chronology of Events related to Cauvery River Water Dispute

- [Karnataka asked to release water](#)

January 15, 2003

- [Karnataka to release 4,500 cusecs of water for a week](#)

January 14, 2003

- [Jaya unhappy with Karnataka's proposal](#)

January 13, 2003

- [Karnataka agrees to release 'some water'](#)
- [Cauvery basin farmers threaten to revive stir](#)

November 29, 2002

- [Jaya indisposed; CRA meeting deferred](#)

November 23, 2002

- [Made Gowda suspends Cauvery agitation till November 29](#)

November 22, 2002

- [Jaya seeks protection for Tamils in Karnataka](#)
- [SC defers hearing on contempt case against Karnataka](#)

November 20, 2002

- [Jaya withdraws remarks against PM, CRA](#)

November 15, 2002

- [Withdraw allegations against CRA: SC to Jaya](#)

November 7, 2002

- [Educational institutions reopen in Mandya](#)

November 6, 2002

- [Karnataka to reduce water outflow to TN](#)
- [Karnataka slams Jaya for questioning CRA](#)
- [Made Gowda demands white paper](#)
- [Karnataka to study Jaya's missive](#)

November 5, 2002

- [Karnataka farmers to end protests if compensated](#)

November 4, 2002

- [Karnataka not to stop releasing water](#)

November 3, 2002

- [Made Gowda, Congress MLA secure bail](#)

November 2, 2002

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- [Curfew lifted in Mandya](#)

November 1, 2002

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- [SC defers hearing on contempt petitions to Nov 15](#)
 - [Karnataka to obey SC order on Cauvery water release](#)

October 31, 2002

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- [Judicial custody for Karnataka farmer leader Made Gowda](#)

October 30, 2002

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- [Curfew imposed in Mandya](#)

October 29, 2002

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- [Made Gowda threatens to launch indefinite fast](#)
 - [Pondicherry demands Cauvery water from TN](#)
 - [Agitating Karnataka farmers attack legislator's house](#)

October 28, 2002

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- [Karnataka starts releasing Cauvery waters](#)
 - [Krishna tenders unconditional apology to SC](#)
 - [Lathi charge on agitating farmers in Mandya](#)

October 27, 2002

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- [Karnataka to convey decision to SC on Monday](#)
 - [Karnataka farmers to resume agitation](#)

October 26, 2002

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- [Increased security near reservoirs makes farmers suspicious](#)
 - [Opposition parties to boycott Krishna's all-party meet](#)
 - [Krishna convenes emergency Cabinet meeting on Sunday](#)

October 25, 2002

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- [Karnataka to decide on SC order on Friday](#)
 - [SC ask Karnataka release 'some water' to Tamil Nadu](#)
 - [SC flays Karnataka for disobeying order](#)
 - [Karnataka farmers threaten to revive stir](#)

October 23, 2002

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- [Theatre screening Tamil movie attacked in Bangalore](#)
 - [TN intent on confrontation: Krishna](#)

October 22, 2002

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- [Karnataka unlikely to release water to TN anytime soon](#)

October 19, 2002

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- [Karnataka Cabinet reviews Cauvery water storage position](#)

October 18, 2002

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- [Punish Krishna for not releasing Cauvery waters: Ramadoss](#)
 - [TN minister Panneerselvam slams Baalu on Cauvery issue](#)

October 16, 2002

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- [Karnataka farmers withdraw agitation](#)
 - [Rajnikanth fasts for Cauvery waters](#)

October 12, 2002

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- [Take note of rains in TN: Krishna's plea to SC](#)
 - [Krishna ends padayatra; moots national water policy](#)
 - [Tamil film artistes stage anti-Karnataka rally in Neyveli](#)
 - [Act on PM's advice: Deve Gowda to TN, Karnataka](#)

October 11, 2002

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- [SC issues notice to Krishna](#)
 - [Faceoff avoided, Rajni puts off fast by a day](#)
 - [Light showers welcome Krishna in Mandya](#)

October 10, 2002

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- [Mettur reservoir closed](#)

October 9, 2002

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- [Krishna cuts short padayatra by two days](#)
 - [Krishna justifies non-release of Cauvery waters](#)
 - [Cracks appear in Tamil filmdom over Cauvery row](#)
 - [Tamil Nadu grinds to a halt](#)
 - [It's raining in Cauvery delta areas](#)
 - [Cauvery row getting embroiled in local politics](#)

October 8, 2002

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- [Krishna to continue padayatra](#)
 - [Trains to be suspended on TN bandh day](#)

October 7, 2002

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- [Jaya precipitating Cauvery crisis: Karnataka minister](#)
 - [Tamil Nadu bandh on Wednesday: Jayalalithaa](#)
 - [DMK boycotts all-party meeting, suggests bandh](#)
 - [Karnataka chief minister begins 'padayatra'](#)
 - [PM hopes a solution would be found to Cauvery water dispute](#)

October 6, 2002

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- [Karnataka, TN indulge in slanging match](#)
 - [Tamil movies, TV channels banned in Karnataka](#)
 - [Jaya wants Karnataka government sacked](#)
 - [Krishna to walk from Bangalore to KRS reservoir](#)

October 5, 2002

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- [Farmers lay siege to Kabini, KRS reservoirs](#)
 - [Rajnikant to participate in October 12 rally](#)
 - [TN to file second contempt petition](#)
 - [Karnataka parties back Krishna on Cauvery issue](#)
 - [Krishna braces for showdown on Cauvery row](#)
 - [Karunanidhi blames Jayalalithaa for Cauvery stalemate](#)
 - [Karnataka not to release Cauvery water](#)

October 4, 2002

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- [Karnataka farmers try to set train afire](#)
 - [Krishna rules out releasing water](#)
 - [SC orders Karnataka to release water to TN](#)
 - [Rajakumar fans may boycott Tamil movies](#)
 - [Rajnikanth steps in to cool tempers on Cauvery](#)

October 3, 2002

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- [SC should not entertain Tamil Nadu's contempt petition: Krishna](#)

October 1, 2002

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- [Cauvery monitoring team heads for Mettur](#)

September 30, 2002

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- [Supreme Court asks Tamil Nadu to cooperate on Cauvery issue](#)

September 29, 2002

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- [Cauvery stir disrupts trains services in Bangalore](#)

September 27, 2002

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- [Krishna unhappy with TN boycott of Cauvery team](#)
 - [Rail roko agitation by Karnataka farmers on September 29](#)

September 25, 2002

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- [Refusal to allow reservoirs inspected may isolate Tamil Nadu](#)
 - [Cauvery panel team visits Karnataka reservoirs](#)

September 25, 2002

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- [Cauvery team visits Mysore on fact-finding mission](#)
 - [Rajakumar leads cine artists' protest rally on Cauvery issue](#)

September 23, 2002

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- [Rajakumar to lead protest march](#)
 - [Tamil Nadu to boycott Cauvery panel meet](#)
 - [Contempt petition: SC issues notice to Krishna](#)
 - [Karnataka farmers form 'suicide squads'](#)

September 22, 2002

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- [Karnataka ignores PM's directive on Cauvery water](#)

September 21, 2002

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- [Vajpayee directs Karnataka to abide by CRA decision](#)
 - [Tamil farm workers burn effigy of Jaya in Mandya](#)

September 20, 2002

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- [Centre asks Karnataka to release water](#)
 - [Karnataka's response to Centre's directive on Saturday](#)
 - [Centre must take over dams across Cauvery: Jaya](#)
 - [DMK boycotts all-party meet in Tamil Nadu](#)
 - ['We don't want to give a single drop of water'](#)
 - [Chandrababu for revival of Ganga-Cauvery link project](#)

September 19, 2002

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- [Farmer's suicide: Compensation demanded](#)
 - [Farmer may have been pushed into Kabini reservoir: Jaya](#)
 - [Karnataka suspends release of water to Tamil Nadu](#)

September 18, 2002

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- [Farmer jumps into Kabini dam to protest cauvery water release](#)
 - [Congress MP Ambareesh offers to resign](#)

September 16, 2002

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- [Violence continues near Kabini dam](#)

September 15, 2002

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- [Kabini: Police opens fire to disperse protesting farmers](#)

September 14, 2002

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- [Water in Mettur reservoir to last only 10 days](#)

September 13, 2002

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- [SC seeks details from Centre about Cauvery water release](#)
 - [Cauvery row: Jaya vs Krishna](#)

September 12, 2002