

4.0 Analysis

4.1 Inflows, Outflows and Storage Position in Karnataka and Tamil Nadu Reservoirs in Cauvery Basin for water year 2016-17

Month/ Year	Karnataka									Flow at Billigundulu G&D site of CWC (TMC) (upto 13.10.2016)			Tamilnadu				
	Reservoir Position(as on 13.10.2016)												Mettur Reservoir(as on 13.10.2016)				
	(Live Storage=104.55 TMC)												(Live Storage = 93.47 TMC)				
	Inflow (TMC)		Outflows (TMC)		Storage(TMC)				Canal withdrawl including evaporation in 2016-17	As per Final Order	Actual 2016-17 (TMC)	Shortfall with respect to normal	Normal Inflows in Mettur reservoir (29 years 1974-75 to 2002-03)	Inflows in Mettur reservoir in 2016- 17	Live storage		Utilisation including evap by TN in 2016-17
Normal (29 years 1974-75 to 2002- 03)	Actual 2016-17	Normal (29 years 1974- 75 to 2002- 03)	Actual 2016- 17	Gross		Live		2015- 16							2016-17	2015- 16	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
May'																	
June'16	33.37	11.72	8.98	4.83	19.11	27.12	14.10	17.10	0.30	10.00	2.88	-7.12	8.79	1.52	41.64	13.42	3.48
July'16	92.81	60.95	46.16	20.12	61.54	74.72	51.51	64.70	2.19	34.00	15.52	-18.48	38.13	16.67	59.67	23.42	6.66
Aug'16	93.15	41.980	60.15	20.331	57.92	84.12	48.046	74.10	24.26	50.00	14.64	-35.36	61.10	14.74	54.59	35.17	2.99
Sept'16	37.95	16.86	21.55	18.41	42.79	69.94	32.77	59.92	13.04	40.00	20.08	-19.92	38.54	19.07	33.05	41.46	12.24
Total	257.34	131.51	136.84	63.69					42.93	134.0	53.09		146.49	52.0			25.37
Percentage of Normal		51.10									39.62			35.42			
Up to 13 th October 2016																	
	12.16	2.58	5.89	5.80	32.92		22.90		6.81	9.23	5.25	-3.97	17.42	4.22		30.41	15.01

Note : The State of Karnataka has desired to use the water related data beyond 2002-03 considering the developments in the basin and the changes in the Hydrological behaviour of the area.

The following inferences can be drawn from the above table

1. The inflow in the Karnataka reservoirs are 49.76 % of the normal flows as on 13.10.2016
2. The inflow in the Mettur reservoir is 34.29 % of the normal flows as on 13.10.2016
3. The measured flow at Biligundulu the point of measurement of releases/ sharing of water to Tamil Nadu by Karnataka is 40.75 % of the normal flows as on 13.10.2016
4. The shortfall in flows in Karnataka which forms the basis of sharing governs the quantum of sharing or releases to Tamil Nadu measured at Biligundulu.
5. Considering the actual inflows as above, the actual flows at Billigundulu is 53.09 TMC as on 30-09-2016 against the scheduled flows of 134.0 TMC in a normal year, and 58.37 TMC as on 13.10.2016 against the scheduled flows of 143.23 TMC in a normal year. The respective percentages are 39.62% and 40.75%. The inflows in the four reservoirs of Karnataka as on 13.10.2016 are 49.70 % of the 29 years average flows.
6. The live storages in Karnataka reservoirs at the end of 13.10.2016 is 22.90 TMC and the storages in Mettur at the end of the same period is 31.66 TMC.

4.2 Analysis of water used by respective states up to 13.10.2016, projected demands and expected inflows

Karnataka

The data as made available by the state is as follows:

- The total water draws from canals including evaporation losses upto 13.10.2016 is 46.60 TMC.
- The details of flows in Karnataka reservoirs using the observed data of 29 years and similar observed flows at Mettur and Biligundulu is appended at **Annex - 3,4 and 5.**

Tamil Nadu

The data as made available by state of Tamil Nadu is as follows:

- The total utilisation by Tamil Nadu from Mettur reservoir during the period ending 13th October 2016 is 40.38 TMC. This does not include the uses under Bhavanisagar and Amravati reservoirs.

4.3 Analysis of the projected water needs till end of May 2017

Karnataka

The state of Karnataka has projected the water requirements up to the period ending May 2017 (1st of October 2016 to May 2017)

- a. Water requirements for the standing crops for its maturity and sustainability- 36.38 TMC.
 - The crop area for which these requirements have been estimated is 4.27 lakh acres.
 - On an average about three waterings have been made and about 3-4 more waterings are required.
 - The crop area sown is 6.15 lakh acres but considering the crop conditions only 4.27 lakh acres have been projected for balance requirements.
 - The total permissible area under Cauvery system under four reservoirs during Kharif is 10.87 lakh acres.
- b. The drinking water requirements including the drinking water requirements of Bangalore city is 23.10 TMC as on 01.10.2016
- c. The total water requirements up to the end of May 2017 including irrigation water upto December 2016 and drinking water upto May 2017 is 59.48 TMC excluding evaporation losses of the order of 6.0 TMC as on 01.10.2016
- d. The industrial water requirements are not projected considering the stress.

Tamil Nadu

The state of Tamil Nadu has projected the water requirements up to the period ending May 2017 (1st October 2016 to May 2017)

- a. The water requirements for cultivation of 12 lakh acres of cropped area up to its maturity is 133.0 TMC. On an average, only one watering has been completed and about 18 more waterings will be required up to the maturity of the crops.
- b. The drinking water requirements under normal conditions is 22.0 TMC
- c. Evaporation Losses are 5.0 TMC
- d. Total water requirements estimated as 160.0 from 1st October to May 2017.

Puducherry

The projected requirement of Puducherry from October, 2016 to May, 2017 is of the order of 3 TMC, which is to be added in the Tamil Nadu's requirement.

4.4 Analysis of estimated inflows during the period October to May using the data for the period 1975-76 to 2002-03.(29 years)

The likely inflows as estimated using the observed data of 29 years (1974-75 to 2002-03)

Karnataka		Tamil Nadu	
Expected inflows in the four reservoirs (TMC)		Expected inflows Mettur reservoir (TMC)	
101.11	Maximum	Maximum	187.18
29.71	Minimum	Minimum	55.02
56.39	50 % dependable	50 % dependable	101.72
39.29	75 % dependable	75 % dependable	81.55
58.66	Average	Average	106.48

1. IMD has predicted a normal North East monsoon
2. The expected inflows into the Karnataka reservoirs during the period October- May in the current water year have been estimated above.
3. The 50% dependable expected inflows as considered to be available along with total available storage available as on 13.10.2016.
4. The total expected inflows at the end of the season (May 2017) is 56.39 TMC in Karnataka reservoirs and 101.72 TMC in Mettur during the period October to May 2016.
5. The total projected requirements of Karnataka with limited standing crop in an area of 4.27 lakh acres as on 1st October 2016 even after sacrificing for Rabi crop is of the order of 65.48 TMC. The total expected availability at the end of May 2017 is 89.16 TMC (56.39 +32.77). The assumption is that NE Monsoon provides flows as assessed above.
6. The total projected requirements of Tamil Nadu with projected area of 12 lakh acres crop is of the order of 160.0 TMC. An additional requirement of 3.0 TMC for Puducherry which Tamil Nadu has to be made available the total projected requirements is 163.0 TMC against the expected available of 143.18 TMC (101.72 + 41.46). The assumption is that NE Monsoon provides flows as assessed above.

Committee's View

- The basis of assessment of the projected crop water requirement is within the range of permissible parameters. However keeping in view the crop condition and water availability there is a scope of further reduction of projected and planned cropped area by the State.

5.0 Summary

5.1 Data Analysis

1. It has been seen from the data that this year is the consecutive low flow year. During the last five years it has been witnessed that three years are low flow years. In such a situation, the uncertainty prevails and farmers of the basin States suffer in the process.
2. The allocation of assessed 740 TMC has been made considering the flows at 50 % dependability. This implies that on an average, every two years out of four years are likely to be low flow years.
3. In case the yield of the Cauvery basin is less in a distress year, the allocated shares shall be proportionately reduced amongst the states.
4. The inflow in the Karnataka reservoirs are 49.76 % of the normal flows as on 13.10.2016. The measured flow at Biligundulu the point of measurement of releases/ sharing of water to Tamil Nadu by Karnataka is 40.75 % of the normal flows as on 13.10.2016.
5. Considering the actual inflows as above, the actual flows at Billigundulu is 53.09 TMC as on 30-09-2016 against the scheduled flows of 134.0 TMC in a normal year, and 58.37 TMC as on 13.10.2016 against the scheduled flows of 143.23 TMC in a normal year. The respective percentages are 39.62% and 40.75%. The flows in the four reservoirs of Karnataka as on 13.10.2016 are 49.70 % of the 29 years average flows.
6. The live storages in Karnataka reservoirs as on 13.10.2016 is 22.90 TMC and the storages in Mettur at the end of the same period is 31.66 TMC
7. The total water requirements of Karnataka up to the end of May 2017 including irrigation water up to December 2016, drinking water up to May, 2017 and evaporation loss of the order of 6.0 TMC are 65.48 TMC. The expected availability upto the end of May, 2017 is 89.16 TMC.
8. The total projected requirements of Tamil Nadu from Mettur with the crop area of 12 lakh acres inclusive of already sown area (4.46 lakh acres), transplanting from paddy nurseries (2.04 lakh acres) as on 10th October 2016 and in the process of sowing in the prepared land is of the order of 133.0 (143-10) TMC and 160.0 TMC including evaporation loss of the order of 5.0 TMC and drinking water requirements. The requirements of Puducherry are about 3.0 TMC as projected by the UT of Puducherry. The total water requirement of Tamil Nadu therefore becomes 163.0 TMC against the expected availability of 143.18 TMC upto the end of May, 2017.
9. In the current year Tamil Nadu has gone for only single Samba crop in the command area of Mettur reservoir to be cultivated in 12 lakh acres for which the government is expected to provide irrigation water.
10. Karnataka has sown an area of 6.15 lakh acres under four reservoirs and about 1.88 lakh acres have withered away and a balance of 4.27 lakh

acres is proposed to be harnessed for which water is expected to be made available.

11. The basis of assessment of the projected crop water requirement is within the range of permissible parameters. However keeping in view the crop condition and water availability there is a scope of further reduction of projected and planned cropped area by the State.

12. Similar situation of low flows have been witnessed by earlier central teams as well.

5.2 Field Visit/ Interaction with Farmers and Public Representatives

1. During the field visits the representations were submitted by public representatives and farmers. The general concerns expressed are as follows:

Karnataka

The gist of the representations in all is on the plight of the farmers due to lack of water for irrigation.

- a. Due to Heavy impact on economy of farmer, many villagers have left villages seeking labour in urban areas.
- b. There is lack of water for livestock.
- c. Almost all tanks in the command are dry.
- d. Requests have been made to give water for drinking and sown crops. As the tanks and wells are going dry, providing water even to cattle has become very difficult. Due to non-payment of agriculture loans, farmers are committing suicide and migrating to the cities seeking labour.
- e. The demand for water for agriculture purposes, water requirements for cattle and human consumption should be first ascertained while deciding the exact quantum of water that has to be released to the neighbouring state of Tamil Nadu.
- f. Farmers have requested to technically explain the actual situation to the Supreme Court.
- g. Farmers have requested to respond to their grievances & award them the crop compensation. The decision to release water to the state of Tamil Nadu may kindly be recalled.

Tamil Nadu

- a. It has been requested to help poor farmers of Cauvery Delta Region in Tamil Nadu in getting their due share of Cauvery water in time so as to take up cultivation works.

- b. Kuruvai could not be cultivated for the past five years and Samba cultivation also got affected. Many districts getting drinking water from Cauvery were also affected.
- c. Ground water level gets affected due to the insufficient release of water and also it leads to sea water intrusion in the irrigation fields.
- d. Agriculture labours have been migrating from Delta districts and also many of them pushed to committing suicide due to financial burden.
- e. Request has been made for the constitution of Cauvery Management Board.
- f. Farmers are suffering for drinking water and irrigation water since available ground water is not suitable. They also requested for water for Kuruvai and Samba.
- g. Kuruvai and samba could not be cultivated. Bank Loan obtained for irrigation could not be repaid.
- h. In the last 20 years we are cultivating only two third area. But this year situation is further poor as there is no water to raise crop even in one third area. Even the ground water level has gone upto 250 feet.
- i. In the current year, no water is released from Mettur dam as Karnataka is blocking water due to Tamil Nadu. Paddy crops raised by direct seeding method are withering due to lack of seasonal rains. No ground water is available. The very existence of farmers and agricultural labourers is at stake.

5.3 During the field visit the status of the agricultural areas have been collected and reported in a separate volume. Some of the important findings are as follows:

- a. As per the field observations in both the states crops have been affected by water stress. In Karnataka, it is mix of Paddy, maize, sugarcane, Ragi etc whereas in Tamil Nadu it is Samba Paddy, turmeric and sugarcane.
- b. The standing crops in Karnataka have withered in some parts of the cropped area.
- c. The direct sown samba has not even germinated and started wilting for want of water
- d. In Karnataka the survived crops are mid growth stage, requiring limited period of watering and may require only 3 to 4 waterings/irrigation to survive the crops which are pre wilting stage.
- e. Some of the tanks have dried up and some have very minimal storages.
- f. Alternative low water crops have been sown in some of the areas.
- g. Some of the areas which are good as of now will wither away if water is not made available.

- h. It was brought to the notice of the committee that ground water in general is available at 1000 ft depth in many parts of Karnataka and Tamil Nadu and is not easily rechargeable.
- i. Individual farmers in both the states bore deep tube wells and produce sugarcane in such water scarce conditions. This needs to be discouraged and stopped.
- j. There is no water for cattle in Tamil Nadu and even the labourers do not have agriculture based livelihood.
- k. The Direct sown Paddy crops in Tamil Nadu is in the initial stages of sowing as the crops have been directly sown in a large extent and requires continuous water for sustainability.
- l. The age of the direct sown paddy in Tamil Nadu on an average is about 20-30 days of seed sowing/ application and is under severe damage conditions due to water stress.
- m. Some area of the field crop are beyond revival stage. In some cases, Direct Sown Paddy crops can be survived with irrigation application.
- n. The irrigation requirements may vary from 15 to 18 waterings in supplementation and complementation of NE monsoon which is expected to be normal.
- o. The remaining lands in Tamil Nadu require either re-sowing or fresh transplantation. This may still require large amount of irrigation water.
- p. It was brought to the notice of the Team by members from Tamil Nadu that undependable North East monsoon mostly occurs in coastal region where no storage is possible. The coastal region also suffers from salt intrusion into the ground water if the level goes down. In this situation, it is considered desirable that number of tanks as many as possible may be constructed/rejuvenated in the coastal area for rainwater harvesting, recharging ground water and resource augmentation.

6.0 Conclusions

Social Aspects

1. The plights of farmers in both the states have been witnessed. In the absence of required water the labour employment for farming and fishing is also limited creating a scenario of unemployment and financial hardship to them.
2. There has been large number of suicides reported in Mandya district of Karnataka.
3. The Government of Karnataka has declared 42 out of 48 Talukas under Cauvery basin as drought affected Talukas based on Central Government guidelines.
4. Both the States of Karnataka and Tamil Nadu need to appreciate interest of Tamil Nadu and Puducherry in protection of their established irrigation and Karnataka's aspirations for development respectively and should educate their people accordingly.

Technical Aspects

1. The deficit impact on account of water allocation at 50 % dependability can be neutralised to some extent by optimal, dynamic and resilient planning of the cropped area considering the flow pattern and forecast. This can address the issue of unemployment and financial hardship in the basin States.
2. The water application techniques are outdated and unscientific and the value of water is not realised. The water applied to the field is on the concept of flooding from one field to another adjacent field and as such the water consumption is on the higher side and during period of distress this becomes very significant depending upon the soil condition. The infrastructure to deliver water to the farmers is century old and has very low conveyance efficiency. This needs to be modernised for optimal use of scarce water. The conveyance efficiency can be further improved by piped distribution network and application efficiency by micro irrigation (sprinkler and drip) and precision irrigation. In addition, on-farm development (OFD) works may be provided to ensure equitable distribution of water to individual farmer's field.
3. At places near the coast the ground water cannot be utilised for the reason that water is saline due to ingress from sea water. The only source of irrigation in such areas is surface water from Mettur reservoir.
4. The efforts made by Government of Tamil Nadu by way of providing subsidised agricultural inputs can bear fruits only when sufficient water is made available for the full crop period.
5. The drinking water demands needs to be optimised and efficient delivery mechanism needs to be put in place.

6. Automated water measuring instrumentation needs to be provided for transparent recording of flows and water diversion along with system for online transmission and retrieval of data through dashboard.
7. Crop alignment and crop diversification need to be practiced.
8. Participatory Irrigation Management is to be encouraged for optimal, efficient and equitable distribution of water amongst the farmers.

Acknowledgement

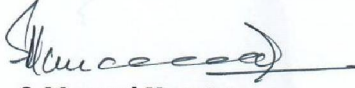
In pursuance to the Supreme Court Order dated 04.10.2016, Ministry of Water Resources, River Development & Ganga Rejuvenation constituted a High Level Technical Team headed by Chairman, Central Water Commission to visit the Cauvery basin area to assess the ground realities in the basin and report the same to the Court.

The Team met on 07.10.2016 at Bengaluru for a preparatory meeting before proceeding to visit Karnataka portion of the Cauvery basin area on 07.10.2016 & 08.10.2016. Thereafter, the Team had visited Tamil Nadu portion of the Cauvery basin area on 09.10.2016 & 10.10.2016. The Committee during the visit met many delegations of farmers, local leaders, NGOs and took representations from them.

The Team would like to express its deep appreciation to both the State Governments of Karnataka and Tamil Nadu for providing all kind of assistance in discharging its duties. The Team conveys gratitude to the staff of Central Water Commission, WRD, Govt. of Karnataka and PWD, Govt. of Tamil Nadu who have helped the Team in writing this report.

Report Submission

The Chairman and members of the High Level Technical Team constituted by the Hon'ble Supreme Court of India visited the Cauvery basin to assess the ground realities and hereby submit the Report.



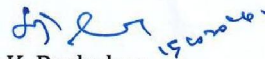
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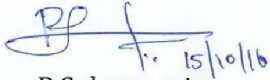
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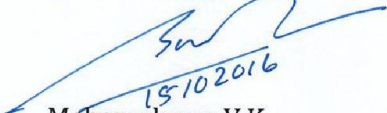
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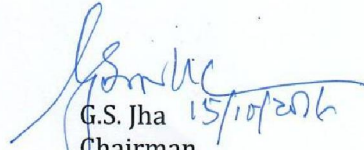
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(Chairman of the High Level Technical Team)

New Delhi
Saturday, 15, October 2016

**THE NOTE ON GROUND REALITIES AS IDENTIFIED BY THE STATE OF
KARNATAKA FOR THE EXPERT COMMITTEE REPORT AS PER SUPREME
COURT DIRECTION DATED 04.10.2016**

1. The Supreme Court in its order dated 04.10.2016 has directed to constitute a Technical Team and the said team shall go to the area in question and submit a report relating to the "**ground reality**" before this Court on 17.10.2016.
2. The Hon'ble Supreme Court in its order dated 04.10.2016 (page 17) has given a specific mandate that "*... team shall go to the area in question and submit a report relating to the ground reality before this Court on 17.10.2016.*" Therefore, the jurisdiction of the Committee as defined in the order is confined and limited only to the assessment of the ground reality in the Cauvery basin in Karnataka and Tamil Nadu after visiting the areas. The remaining issues on the monthly releases, including the question whether proportionate reduction of shares contemplated in Clause-VII of the Final Order dated 05.02.2007 published on 19.02.2013 applies to the monthly distress or not is a question pending before the Supreme Court. This Committee has no authority or power to go into all those questions of law or fact, which arise in the implementation of the said final order.
3. The ground realities, according to the State of Karnataka means - consideration of available water in the storages and likely inflows, the actual water requirement for standing crops and crops to be planted, the drinking water requirement on priority, the performance of North-East rainfall, availability of groundwater, etc. It is further submitted that:
 - (a) The failure of South - West monsoon with reference to normal rainfall and the shortage of inflow to the four reservoirs of Karnataka.
 - (b) Reservoir storage as on the date of inspection and likely inflows into the reservoirs in the balance period of the water year upto May 2017.
 - (c) Since 2015-16 was a distress year and 2016-17 is going to be a bad year, the normal estimated inflows may not realise and as per para 29 of Chapter 7 of Vol.5 of C.W.D.T. Report the monthly schedule of releases are to be relaxed and the reservoirs be operated in an integrated manner based on the requirements of the basin States duly considering the ground realities.
 - (d) The actual sown area compared to the area allowed as per the Award, the age of crop and requirement of water for the balance period.
 - (e) The ground water position and the moisture stress in the command area.

- (f) The requirement of drinking water for cities, towns and villages in the basin area upto the end of May 2017.
- (g) The likely performance of North – East monsoon is to be considered. According to I.M.D. predictions 2016-17 will have a normal rainfall during North – East monsoon.
2. In the beginning of the kharif season, considering the distress the State of Karnataka has cultivated in 6.15 lakh acres as against the permitted area of 18.85 lakh acres (k 14.83 + r 3.62 + p 0.40).
 3. Due to insufficient supply of required water, the crops in 1.88 lakh acres have withered away and the standing crops as of now is only 4.27 lakh acres requiring 37.27 tmc of water for the balance period.
 4. The drinking water requirement for the cities, towns and villages including Bengaluru and Mysuru cities upto the end of May 2017 is 23.05 tmc.
 5. The combined live storage of four reservoirs as on 13.10.2016 is only 22.93 tmc and the minimum likely inflows upto December 2016 is 15.171 tmc. Hence, the likely resources available to the State of Karnataka is not sufficient even to meet the minimum requirement upto May 2017.
 6. If the likely inflows in the balance period of the water year improve the releases to the State of Tamil Nadu may be considered after meeting the requirements for the drinking water needs and for the standing crops of the State.
 7. However, the uncontrolled catchment below Kabini and K.R.S. upto Biligundulu and from Biligundulu upto Mettur are likely to contribute 55 tmc and 8.86 tmc respectively to Mettur reservoir from October to December based on average flows.
 8. In the Cauvery basin area 42 talukas out of 48 talukas have been declared as drought affected talukas as per the Central Government guidelines.
 9. During 2015-16 which was a distress year, though the State of Karnataka had ensured 156 tmc of water at Biligundlu, due to good rainfall during North – East monsoon the farmers of the State of Tamil Nadu were able to raise bumper Samba crop.
 10. The State of Tamil Nadu has planned to irrigate 12 lakh acres during Samba crop as against the permitted area of 13.08 lakh acres as per Final Order of the Award which is 91.7%. Whereas, the State of Karnataka is demanding water for only 4.27 lakh acres against the permitted area of 15.22 lakh acres during kharif which is 28.06%. This clearly indicates the abnormality of the demand of the State of Tamil Nadu.
 11. As per the Memorandum of the State of Tamil Nadu, the direct sowing has been done in 4.46 lakh acres and transplantation is done in 2.04 lakh acres totaling to 6.50 lakh acres which is 54.2%. Hence, as per the ground reality the water requirement of the State of Tamil Nadu be considered for 6.50 lakh acres only.

12. The live storage of 31.66 tmc at Mettur as on 13.10.2016 and likely inflows of 63.86 tmc during North – East monsoon to the Mettur reservoir coupled with available ground water and normal North – East monsoon will be more than sufficient to meet the requirement of Samba crop for 6.50 lakh acres.
13. In conclusion, Karnataka submits that having regard to the factors on ground reality submitted above, no further releases from Karnataka reservoirs towards inter-State border and Tamil Nadu would be justified. If further releases are recommended, it will lead to drinking water starvation and mass unrest in the drought affected districts of Mandya, Mysore, Hassan, Chamarajanagara, Ramanagar and Bengaluru. Whereas, the present live storage of 30.492 tmc at Mettur and likely inflows would be sufficient to meet the requirement of irrigation, etc., in the downstream.

**The views of the Members representing the State of
Tamil Nadu to the Report of the High Level Technical Team.**

The Hon'ble Supreme Court in its Order dated 04.10.2016 has directed for the constitution of a High Level Technical Team and has ordered that "the said team shall go to the area in question and submit a report relating to the ground reality before this Court on 17.10.2016".

According to Tamil Nadu, the ground reality has to include, apart from furnishing meteorological and hydrological information of the reservoirs and crop position in the party States, the realization of water at the inter-State border with reference to the Final Order of the Cauvery Water Disputes Tribunal and the ground situation in the Cauvery fed areas of Tamil Nadu. In other words, in the current year, the position during the end of South West Monsoon has to be spelt out and the flow to be ensured at the border as per the language employed in the Final Order of the Cauvery Water Disputes Tribunal has to be indicated, so that the Hon'ble Supreme Court can take appropriate decision. The report of the High Level Technical Team is silent on this.

In the current year's scenario, the extent of single Samba paddy crop under Mettur reservoir in Tamil Nadu is only 12 lakh acres against the permitted extent of about 15 lakh acres by the Cauvery Water Disputes Tribunal due to water stress and also we have gone for direct sowing in a large extent to avoid loss of the season as a contingent measure. The water requirement for this extent is about 143 TMC ft., to sustain the crop. Apart from the above, the drinking water needs are also to be met from the waters from Mettur reservoir for the period from October, 2016 to May, 2017 and the requirement is 22 TMC ft.

Karnataka has to ensure at Billigundulu 134 TMC ft. from June to September as per the Final Order. Rainfall in the catchment areas of Karnataka, the summer utilization of water by Karnataka and the unauthorized diversions by Karnataka have to be taken into the account and the quantity of water to be made available to Tami Nadu should be worked out as per the language employed in the Final Order of the Cauvery Water Disputes Tribunal.

Karnataka after having utilized more than 110 TMC ft. for irrigating the crop areas under the 4 major reservoirs, anicut channels, minor reservoirs, minor schemes and unauthorized schemes has stated that it requires about 37 TMC ft. for irrigating 4.27 lakh acres under the 4 major reservoirs including semi dry crops in the balance period, i.e. with a delta of 2.00 ft. or 60 cm, which is very high. The projected drinking water supply claim of Karnataka is very high. The claim of Karnataka is untenable, since it has raised paddy and perennial crops in a larger extent than what has been permitted in the Final Order of the Cauvery Water Disputes Tribunal. These aspects have not been dealt with in the report of

the team. The waters impounded in the reservoirs of Karnataka have to be released to Tamil Nadu forthwith and the future releases are to be made as per the Final Order of the Cauvery Water Disputes Tribunal to save the single Samba crop.

STATEMENT SHOWING THE MONTHWISE INFLOWS INTO KARNATAKA RESERVOIRS IN THE 42 YEARS PERIOD FROM 1974 - 75 TO 2015-16

(ALL FIGURES IN MCFT)

Sl. No.	YEAR	JUN	JUL	AUG	SEP	Total from Jun - Sep	OCT	NOV	DEC	Total from Oct - Dec	Total from Jun - Dec	JAN	FEB	MAR	APR	MAY	Total from Jan - May	ANNUAL TOTAL
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1974-75	2535	102400	123026	36858	264819	21187	5762	4003	30952	295771	1636	1521	1415	1177	2587	8336	304107
2	1975-76	69917	82747	150143	68412	371219	35490	17363	4106	56959	428178	2937	2893	3051	5409	2789	17079	445257
3	1976-77	2199	41172	55527	32081	130979	6893	11322	2516	20731	151710	1293	1298	1280	2674	7234	13779	165489
4	1977-78	28704	101702	52170	52836	235412	50586	24675	8780	84041	319453	1868	1292	1663	5193	7055	17071	336524
5	1978-79	61932	110338	158467	45422	376159	18677	16462	5337	40476	416635	3623	1317	2277	4552	4142	15911	432546
6	1979-80	29514	80035	154318	31665	295532	17144	17922	5353	40419	335951	-515	3902	1405	4019	7483	16294	352245
7	1980-81	73646	209861	93801	41608	418916	22883	15148	6661	44692	463608	1850	962	1144	-43	4504	8417	472025
8	1981-82	41261	78947	173311	60739	354258	23639	14157	5659	43455	397713	4235	1390	1244	416	3309	10594	408307
9	1982-83	24047	58118	105515	18344	206024	13287	8803	4071	26161	232185	2850	459	39	-1088	1291	3551	235736
10	1983-84	24170	74116	100404	44653	243343	27622	11735	8118	47475	290818	3245	2710	5559	2315	2668	16497	307315
11	1984-85	67682	128377	67706	29714	293479	42229	5827	5546	53602	347081	3267	697	463	2752	2212	9391	356472
12	1985-86	46966	51034	73225	22702	193927	14674	10376	7554	32604	226531	2364	528	-219	341	2158	5172	231703
13	1986-87	32284	59495	101434	21664	214877	12754	17026	2889	32669	247546	3328	30	-1416	-510	-272	1160	248706

14	1987-88	8199	26320	35416	20842	90777	28643	15824	7684	52151	142928	1799	603	-294	1438	1285	4831	147759
15	1988-89	9463	73335	69139	42949	194886	16675	6488	6456	29619	224505	1302	-250	924	283	1231	3490	227995
16	1989-90	20988	103288	70774	28962	224012	21442	9167	6879	37488	261500	1238	1101	-1352	-810	-309	-132	261368
17	1990-91	29253	72689	103797	24753	230492	22672	15234	8139	46045	276537	1622	824	-2065	2695	2118	5194	281731
18	1991-92	45152	167152	94872	23427	330603	26971	14337	3883	45191	375794	232	-240	-985	-470	3894	2431	378225
19	1992-93	75890	115611	116533	61958	369992	34989	34469	8474	77932	447924	1371	-745	-813	1043	3804	4660	452584
20	1993-94	22157	79562	95951	21105	218775	36549	10650	5434	52633	271408	308	-417	-1502	1379	2419	2187	273595
21	1994-95	52072	197063	83175	58403	390713	56120	21648	6597	84365	475078	2228	1033	980	3875	7112	15228	490306
22	1995-96	10312	93515	50877	81054	235758	17400	13126	5562	36088	271846	946	232	-178	1800	-200	2600	274446
23	1996-97	35176	77922	65506	32429	211033	53715	10535	1148 1	75731	286764	1816	559	-56	-28	4310	6601	293365
24	1997-98	8092	106652	133868	29609	278221	22532	24484	9561	56577	334798	1286	1800	1485	2573	4045	11189	345987
25	1998-99	21489	111808	65800	45155	244252	40649	19326	1015 1	70126	314378	1408	1938	-438	2215	9660	14783	329161
26	1999-2000	32897	104247	74272	18631	230047	53376	13248	7875	74499	304546	1009	141	753	1193	1726	4822	309368
27	2000-01	36930	76797	88512	57864	260103	42896	9846	1127 5	64017	324120	1573	1044	542	6259	4136	13554	337674
28	2001-02	36214	80806	67298	26006	210324	24219	15348	6244	45811	256135	1271	301	-597	138	920	2033	258168
29	2002-03	18566	26323	78175	20659	143723	35673	15047	6257	56977	200700	1887	836	986	1282	227	5218	205918
AVERAGE OF 29 YRS.		33369	92808	93207	37948	257332	29020	14667	6639	50326	307658	1837	957	527	1796	3225	8342	316000
30	2003-04	12102	41161	43697	18336	115296	19960	6289	4114	30363	145659	1391	665	289	1061	9042	12448	158107

31	2004-05	59165	47133	103571	19435	229304	21305	11622	2997	35924	265228	1448	923	1125	1166	1680	6342	271570
32	2005-06	16495	121325	117787	56518	312125	50834	19866	1071 5	81415	393540	2303	922	905	2171	11156	17457	410997
33	2006-07	39434	134207	93947	40022	307610	20721	18943	9205	48869	356479	2561	984	474	36	288	4343	360822
34	2007-08	28191	183845	113486	70376	395898	46147	18794	1419 5	79136	475034	5424	3090	7678	4652	2843	23687	498721
35	2008-09	21507	48651	106939	43416	220513	38692	16761	1003 7	65490	286003	3732	1347	846	1082	1619	8626	294629
36	2009-10	4913	146019	61418	78153	290503	40062	27298	1622 9	83589	374092	7181	459	-334	677	3666	11649	385741
37	2010-11	13299	48795	60254	52011	174359	40765	62122	1966 0	122547	296906	7243	1766	1183	5005	3964	19161	316067
38	2011-12	40736	69868	72409	75693	258706	33533	26924	1570 3	76160	334866	7673	3594	1899	3307	2427	18900	353766
39	2012-13	5776	33442	63009	49165	151392	16645	11386	6056	34087	185479	1938	1088	1354	688	711	5779	191258
40	2013-14	55394	153138	96867	36131	341530	21990	11106	9565	42661	384191	3452	953	125	481	5192	10203	394394
41	2014-15	17660	106689	99116	60525	283990	31883	9903	1389 8	55684	339674	3941	985	877	930	4787	11520	351194
42	2015-16	58002	45419	35138	24140	162699	21153	19345	7227	47725	210424	2597	1035	661	676	744	5713	216137
AVG. OF 25 YRS. Foll. the interim order of 1991		30705	96686	83299	44009	254699	33951	18497	9296	61744	316443	2649	972	690	1728	3607	9645	326088
AVERAGE OF 42 YRS.		31914	92170	89777	41058	254919	29649	16327	7908	53884	308803	2480	1085	771	1762	3373	9471	318273

Source: Inflows into K.R.S, Harangi, Hemavathy & Kabini and Outflows from Harangi & Hemavathy for the period from 1974 -75 to 1995 - 96 :Information in Common Format KR.Exh. No.E-52,E-69 ,E-65, E-68 &E-99 filed by Karnataka before the cauvery Water Disputes Tribunal & from 1996 - 97 to 2015-16 information as per exchange of data . Averages for 29 yrs.from 1974-75 to 2002-03 are the same as average figures furnished on 07.07.2003 to the subgroup of technical experts (constituted in 17th CMC)

Total inflows into Karnataka Reservoirs = Net inflows into K.R.S + Inflows into Kabini

NOTE : - The monthwise lowest flows for the 42 years period has been shown in **BOLD** letters and highest flows has been shown in **ITALICS**.

STATEMENT SHOWING THE MONTHWISE INFLOWS AT METTUR RESERVOIRS IN THE 42 YEARS PERIOD FROM 1974 - 75 TO 2015-16

(ALL FIGURES IN MCFT)

Sl. No.	YEAR	JUN	JUL	AUG	SEP	Total from Jun - Sep	OCT	NOV	DEC	Total from Oct - Dec	Total from Jun - Dec	JAN	FEB	MAR	APR	MAY	Total from Jan - May	ANNUAL TOTAL
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1974-75	2303	43014	104136	48931	198384	38654	9644	6140	54438	252822	4440	3355	3857	4690	10774	27116	279938
2	1975-76	13126	68863	127411	82963	292363	52565	45215	9495	107275	399638	4190	1796	4929	8234	8944	28093	427731
3	1976-77	4449	4285	25514	28117	62365	20168	14591	6323	41082	103447	2271	3347	3718	6662	15644	31642	135089
4	1977-78	5765	37269	43786	46849	133669	89964	38501	15104	143569	277238	4865	1078	1020	9809	10732	27504	304742
5	1978-79	19679	72411	123876	55855	271821	31477	31575	11515	74567	346388	5609	4778	4225	8147	11784	34543	380931
6	1979-80	7938	28031	135825	51324	223118	27853	31871	15131	74855	297973	4958	4592	3812	5482	7597	26441	324414
7	1980-81	25900	167695	76119	35490	305204	31444	20256	10238	61938	367142	2599	4533	4775	5117	9848	26872	394014
8	1981-82	20901	23991	145653	99847	290392	42483	29604	15200	87287	377679	5243	2544	4193	4936	8605	25521	403200
9	1982-83	12716	13673	53094	17813	97296	22453	20591	8080	51124	148420	1747	5425	4678	4052	8774	24676	173096
10	1983-84	12359	23789	55731	44983	136862	23131	14772	16362	54265	191127	6442	9204	9998	5867	7732	39243	230370
11	1984-85	24408	88291	44016	25485	182200	55295	16244	9509	81048	263248	3459	2249	4226	5201	5975	21110	284358
12	1985-86	12870	22387	31854	25363	92474	18673	14542	11976	45191	137665	4660	4881	3179	2958	4934	20612	158277
13	1986-87	3718	13740	54244	25142	96844	27992	26024	9229	63245	160089	5826	358	5332	3661	5005	20182	180271

14	1987-88	6777	2286	5901	10906	25870	28899	17724	10805	57428	83298	584	2778	3507	5402	8331	20602	103900
15	1988-89	4352	19728	33914	61627	119621	16979	11940	4523	33442	153063	10990	7261	3270	2786	4003	28310	181373
16	1989-90	2922	31287	35507	23475	93191	27084	18245	9625	54954	148145	4646	8551	3754	3746	6804	27501	175646
17	1990-91	2706	17143	44385	18309	82543	12528	17051	10712	40291	122834	4367	2541	3816	4100	6211	21035	143869
18	1991-92	16053	67564	85483	29031	198131	38853	57033	18291	114177	312308	7709	3976	3135	3414	4417	22651	334959
19	1992-93	13775	53764	105434	51785	224758	48689	34869	16176	99734	324492	7243	3281	4351	4921	7405	27201	351693
20	1993-94	4805	22822	57983	22984	108594	47109	22367	17369	86845	195439	6692	4387	3519	5387	7947	27932	223371
21	1994-95	4813	111026	58314	51975	226128	70942	39067	12330	122339	348467	4868	4253	3629	5793	6147	24690	373157
22	1995-96	4266	22033	19855	52291	98445	31935	19548	5543	57026	155471	10861	3348	4106	6213	3087	27615	183086
23	1996-97	4898	20251	37316	38541	101006	73426	21582	20425	115433	216438	6567	3206	5777	5744	6331	27625	244063
24	1997-98	2851	22562	88104	25841	139358	33915	43086	24348	101349	240707	7514	3947	4316	5798	5554	27129	267836
25	1998-99	1555	33646	40728	38797	114726	43658	30000	17726	91384	206110	4845	4072	5333	5958	11417	31625	237736
26	1999-2000	10429	23940	55670	10206	100245	77702	43580	20020	141302	241547	7029	4384	4312	5562	5602	26889	268436
27	2000-01	2590	19269	38847	60325	121031	114219	25620	19084	158923	279954	5828	3661	4112	7021	5262	25884	305838
28	2001-02	4173	23804	21365	24347	73689	39009	27782	10666	77457	151146	2010	2046	2622	2580	2210	11468	162614
29	2002-03	1810	7234	21776	9026	39846	17747	20178	6122	44047	83893	4818	3898	1166	488	607	10977	94870
AVERAGE OF 29 YRS.		8790	38131	61098	38539	146558	41546	26314	12692	80552	227110	5272	3922	4092	5163	7161	25610	252720
30	2003-04	631	1508	15190	12980	30309	15523	9322	4771	29616	59925	532	390	233	1008	3072	5235	65160

31	2004-05	13048	22946	40257	26598	102849	29610	19970	5701	55281	158130	676	419	525	2533	2310	6463	164593
32	2005-06	2878	33352	91843	52434	180508	105757	60676	<i>26471</i>	<i>192904</i>	373412	7741	2838	6069	3760	7803	28211	401623
33	2006-07	9621	59589	72301	24484	165995	22767	27888	9512	60168	226163	1546	775	1954	2521	2972	9768	235931
34	2007-08	2026	86714	90725	56853	236318	48381	25033	11257	84671	320989	1264	880	7532	6425	7612	23713	344702
35	2008-09	7349	4373	64254	40011	115987	38454	19760	17225	75439	191426	1738	1279	1987	3121	4976	13101	204527
36	2009-10	6064	39896	34802	55345	136107	25270	23925	10941	60136	196243	3999	2239	3310	5953	7946	23447	219690
37	2010-11	8223	6719	23854	22511	61307	24936	<i>66270</i>	17050	108256	169563	4252	2917	5640	9535	10275	32619	202182
38	2011-12	6284	25222	31866	51220	114592	31239	31198	13196	75633	190225	3297	1682	2207	3361	6026	16573	206798
39	2012-13	2325	1033	7150	17558	28066	19245	7910	8329	35484	63550	2269	2884	575	245	204	6177	69727
40	2013-14	8348	73892	76442	27332	186014	17402	16977	4882	39261	225275	1297	871	1923	1549	4699	10339	235614
41	2014-15	6783	34666	57682	36639	135770	37023	16066	9031	62120	197890	1266	380	473	1476	6608	10203	208093
42	2015-16	11658	24728	22707	17211	76304	16850	30942	9971	57763	134067	532	269	337	221	240	1599	135666
AVG. OF 25 YRS. Foll. the interim order of 1991		6290	33702	50398	34253	124643	42786	29626	13458	85870	210513	4256	2491	3166	4023	5229	19165	229679
AVERAGE OF 42 YRS.		8099	36201	57165	37114	138579	38983	26644	12295	77923	216501	4364	3132	3606	4558	6486	22146	238647

Source: Gauged flow at Mettur : For the period from 1974-75 to 1995-96: Information in Common Format of Tamil Nadu, T.N.Exh.E-19 & E-102 filed before the Cauvery Water Disputes Tribunal & 1996-97 to end of May 2015: Information as per Exchange of Data.

NOTE : - The monthwise lowest flows for the 42 years period has been shown in **BOLD** letters and highest flows has been shown in *ITALICS*.

STATEMENT SHOWING THE MONTHWISE GAUGED FLOWS AT BILIGUNDLU IN THE 42 YEARS PERIOD FROM 1974 - 75 TO 2014-15

(ALL FIGURES IN MCFT)

Sl. No.	YEAR	JUN	JUL	AUG	SEP	Total from Jun - Sep	OCT	NOV	DEC	Total from Oct - Dec	Total from Jun - Dec	JAN	FEB	MAR	APR	MAY	Total from Jan - May	ANNUAL TOTAL
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1974-75	1443	48895	120445	55872	226654	43397	15064	11845	70306	296961	3672	2777	2021	3066	8188	19723	316684
2	1975-76	13885	71783	136134	83825	305626	56154	48424	12715	117293	422920	6389	4104	5834	7743	8426	32496	455416
3	1976-77	4388	5552	28702	28208	66850	16621	10841	5449	32911	99761	3304	2662	3076	5941	13461	28443	128204
4	1977-78	6231	41570	48500	49663	145965	86702	35521	15071	137294	283259	8742	4148	4398	8517	8595	34399	317658
5	1978-79	19503	75398	137795	58549	291245	31091	28734	11905	71730	362974	7682	6219	4649	7720	11349	37619	400594
6	1979-80	9820	32113	137048	52960	231941	28953	27855	14315	71123	303064	7219	4828	3630	5410	7283	28370	331434
7	1980-81	29796	181456	89531	40872	341655	33409	21603	13503	68515	410170	8479	4273	5283	5606	9135	32775	442945
8	1981-82	21283	27492	151894	98376	299045	39867	28170	16826	84863	383908	8317	5921	5293	5365	8276	33172	417080
9	1982-83	14122	19156	62750	26817	122846	23436	18216	12806	54458	177304	8223	7950	5660	5467	9667	36967	214271
10	1983-84	10746	23770	58370	49778	142664	28121	21191	16108	65420	208084	10111	9548	10632	6957	9166	46413	254497
11	1984-85	27269	91845	50945	30116	200174	57490	20019	14302	91811	291985	7681	4015	4786	5666	6337	28486	320470
12	1985-86	14161	21452	37400	27214	100227	22370	16788	13829	52987	153213	6602	5066	3585	3552	3708	22513	175726
13	1986-87	3341	11492	47190	27937	89960	30798	26610	12817	70224	160184	10669	10731	4729	3552	4739	34420	194604

14	1987-88	5171	3392	5688	10572	24823	23647	18509	12107	54263	79086	4965	7088	4164	4548	7563	28327	107413
15	1988-89	4484	18823	33172	55306	111786	20431	13767	10518	44716	156502	10972	8332	5385	4688	5475	34851	191353
16	1989-90	4380	29351	36426	25520	95677	29880	17227	12060	59167	154844	6874	8496	4528	4868	7229	31994	186838
17	1990-91	4753	16307	43179	18692	82931	15645	18225	12930	46800	129730	6696	4297	4605	5219	7056	27874	157605
18	1991-92	14261	77865	84959	31186	208271	41146	41887	20620	103653	311924	9478	5019	4317	4634	5211	28659	340583
19	1992-93	16696	61482	99222	53082	230482	47691	31278	15985	94954	325436	8869	4708	5369	5989	8240	33175	358611
20	1993-94	7721	26589	57396	24248	115954	42716	21639	16496	80851	196805	9340	5205	4493	5937	8606	33581	230386
21	1994-95	8139	118613	60896	52679	240327	68377	36358	16941	121676	362003	9117	5371	4725	6181	6600	31994	393997
22	1995-96	5111	23993	24419	48151	101674	31621	19927	11679	63227	164901	12388	4548	4295	5071	4308	30610	195511
23	1996-97	5236	19742	37134	40441	102553	67168	22484	19425	109077	211630	8904	4883	6664	6305	7367	34123	245753
24	1997-98	5673	27654	82945	29582	145854	35229	37719	23459	96407	242261	9987	5327	5673	6855	6960	34802	277063
25	1998-99	5145	40456	40603	43163	129367	44953	30338	17436	92727	222094	8160	5468	6300	7542	10832	38302	260396
26	1999-2000	12039	29697	56793	16925	115454	68848	34457	20581	123886	239340	9481	6077	5718	6930	6130	34336	273676
27	2000-01	6134	22033	41950	59499	129616	103559	27586	20924	152069	281685	9368	5710	5835	8828	7834	37575	319260
28	2001-02	8249	27580	25996	24889	86715	38097	29176	14409	81681	168396	6736	4190	4500	4461	3919	23807	192203
29	2002-03	3360	7897	21635	13774	46665	17871	19105	9811	46788	93452	6476	4545	2368	1503	1543	16435	109887
AVERAGE OF 29 YRS.		10088	41498	64107	40617	156310	41217	25473	14720	81410	237720	8100	5569	4914	5659	7352	31594	269314

30	2003-04	1408	2441	13398	13385	30632	18010	11177	6464	35652	66283	2503	1523	701	2059	2489	9275	75558
31	2004-05	11094	23768	42883	28863	106608	30512	19863	9114	59489	166097	3980	2956	3401	3763	3712	17812	183909
32	2005-06	3865	36735	87335	53373	181307	90867	51108	<i>24567</i>	<i>166541</i>	347849	9367	4507	7520	5906	8768	36068	383916
33	2006-07	12476	62939	69484	27580	172479	25264	25438	12609	63311	235790	5304	4279	5165	4040	4003	22791	258581
34	2007-08	3516	83357	88468	60384	235725	48954	25782	12633	87369	323094	3728	3588	7630	7085	8504	30535	353629
35	2008-09	7765	10946	58436	39309	116456	35746	20441	15489	71676	188132	4537	3687	4335	3918	5509	21986	210118
36	2009-10	4967	39040	33955	55514	133476	27312	21839	11740	60891	194367	5337	3478	4418	6912	8148	28293	222660
37	2010-11	7674	9229	24585	25392	66880	28086	<i>61173</i>	17489	106748	173628	5996	4909	6589	<i>9627</i>	11008	38129	211757
38	2011-12	9307	31055	37344	56369	134075	32924	32406	14268	79598	213673	5503	4476	4593	6250	5955	26777	240450
39	2012-13	4117	4153	11120	20759	40149	21799	11787	12267	45853	86002	4222	4310	2280	2047	1576	14435	100437
40	2013-14	11359	72884	74128	31694	190065	22548	20825	7820	51193	241258	3921	2221	3175	3889	5040	18246	259504
41	2014-15	5978	34379	61023	41342	142722	37803	16698	10413	64914	207636	3973	1571	2704	5202	8302	21752	229388
42	2015-16	12600	27260	26480	22350	88690	19040	28440	9240	56720	145410	3760	1920	1920	1390	2010	11000	156410
AVG. OF 25 YRS. Foll. the interim order of 1991		7756	36871	50503	36557	131688	41846	27957	14875	84678	216366	6817	4179	4587	5293	6103	26980	243346
AVERAGE OF 42 YRS.		9254	39087	59232	39386	146959	38908	25850	14071	78829	225788	7072	4879	4689	5386	6863	28889	254677

Source: Gauged flow at Biligundlu :Averages for 29 yrs.from 1974-75 to 2002-03 furnished on 07.07.2003 to the subgroup of technical experts (constituted in 17th CMC) was based on Water year books upto 1996-97 and 1997-98 to 2002-03 on daily data furnished by CWC. However further data for the period from 1996-97 to 2013-14 has been updated from Water Year Books of C.W.C received since then and from June 2014 onwards data is as per flow data received over telephone.

NOTE : - The monthwise lowest flows for the 42 years period has been shown in **BOLD** letters and highest flows has been shown in *ITALICS*.

