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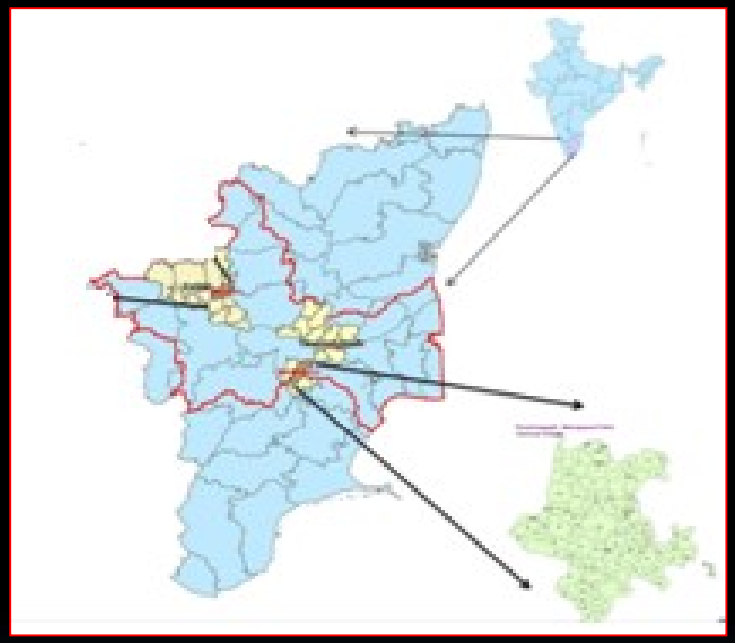
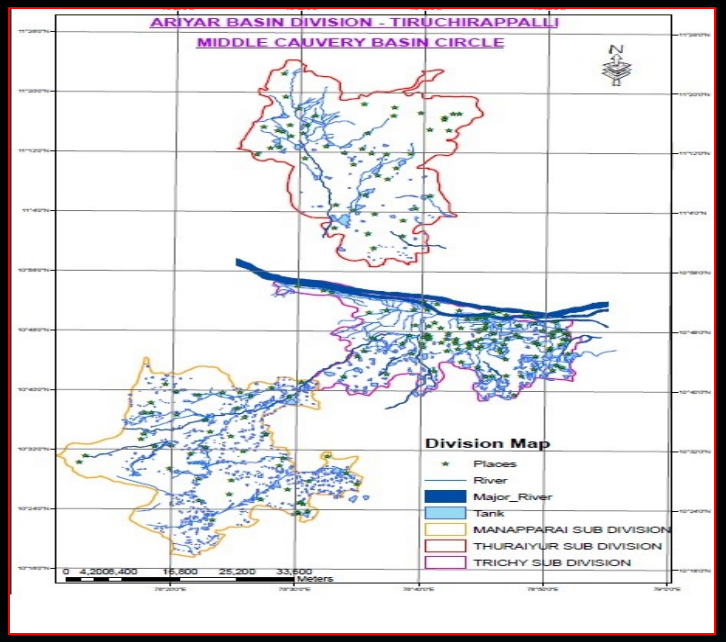
Irrigation Management Training Institute

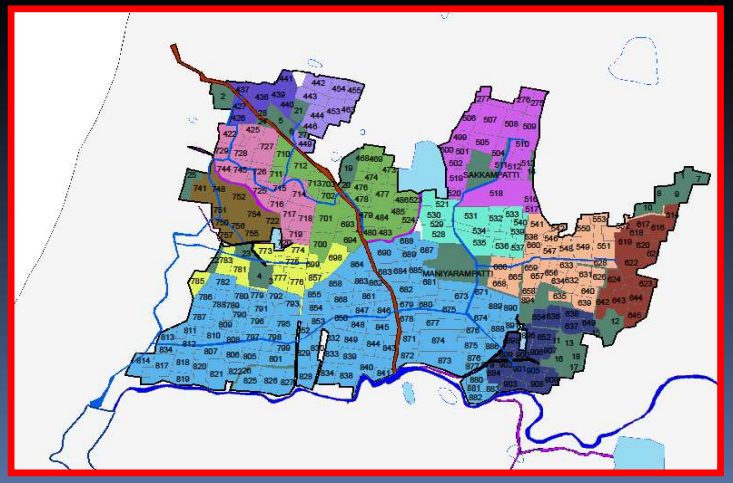
IMPACT OF CLIMATE CHANGE ON THE HYDROLOGY OF PONNANIAR RESERVOIR SYSTEM

Project area

Ponnaniar Reservoir System







Information about the project.....

New Ayacut : **1830 Acres**

Old Ayacut : **271 Acres**

Total : 2101 Acres

	Length in m
Main Canal	3340 m
Distributary I	3500 m
Distributary II	720 m
Branch Distributary	1440 m
Sub Branch Distributary	330 m
Field Bothy No. I	1335 m
Field Bothy No. II	360 m
Field Bothy No. III	740 m
Field Bothy No. IV	720 m
Field Bothy No. V	1260 m
Field Bothy No. VI	1200 m
Field Bothy No. VII	420 m
Field Bothy No. VIII	340 m

Irrigation Supply to the field

- Date of Opening / closing 1st September to 31st January.
- For the existing old Ayacut of 271 acres

  5 Cusecs from 1st September to 31st October
  3 Cusecs till the end of January.

- For the new ayacut of 1830 acres under the canal

	Acres/Cusecs
1st September to 31st October	50
1st November to 31st December	75
1st January to 31st January	75

Irrigation Demand

Month	Demand in Cusecs	Demand (MCFT)	Demand (Field)	Inflow in Mcft
September	42	108.86	54.43	15.79
October	42	112.49	56.25	24.95
November	28	72.58	36.29	57.26
December	28	75.00	37.50	27.52
January	28	75.00	37.50	13.31
February	3	7.26	3.63	9.99
March	3	8.04	4.02	6.93
April	3	7.78	3.89	3.50
May	3	8.04	4.02	5.25
June	3	7.78	3.89	2.83
July	3	8.04	4.02	2.01
August	3	8.04	4.02	4.21
Total		498.87	249.44	173.56

Crops grown .....

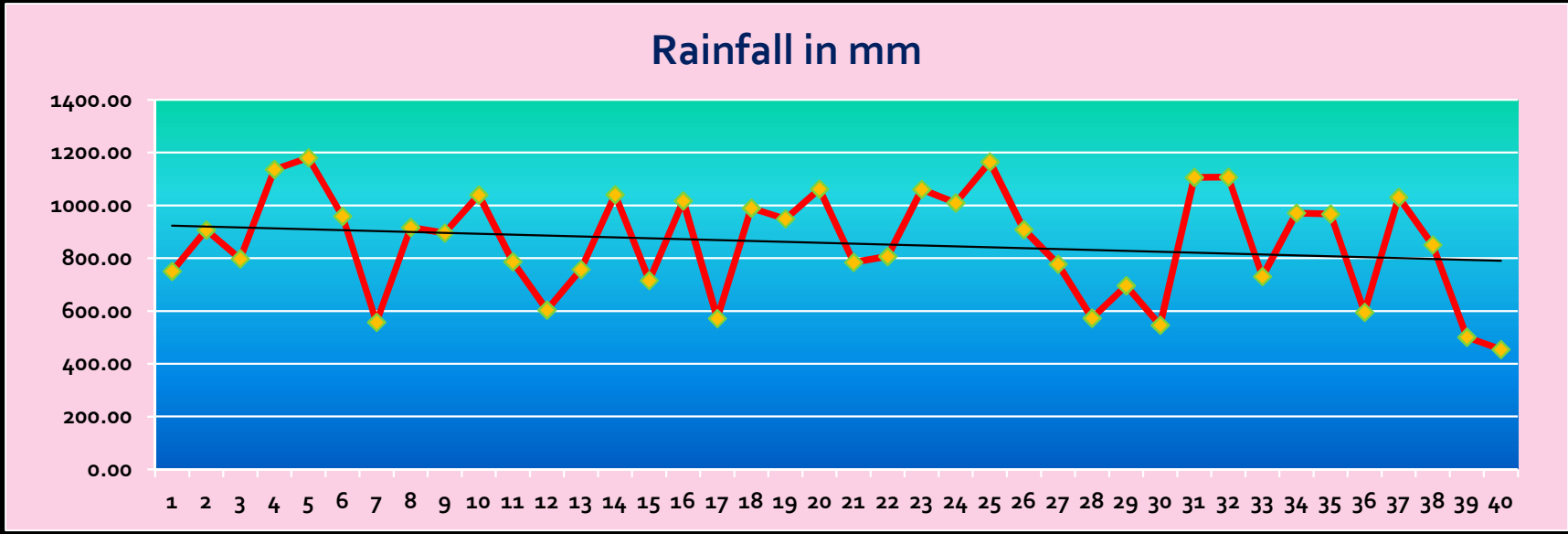
Initially

- Paddy
- Flowers
- Vegetables
- Millets
- Groundnut
- Cotton
- Coconut
- Orchards

Presently

- Paddy
- Flowers
- Vegetables

Model the hydrology of the Ponnaniar Reservoir system for understanding the impact of Climate change



- Out of 39 years, 11 years - normal rainfall, 12 years - excess rainfall and 13 years - deficit rainfall
- No definite periodicity, but, raising and falling epochs observed.
- After 2000, in a span of 12 years (from 2000 to 2012,) deficit rainfall is experienced in 7 years
- Worst drought were in 1980, 1990, 2000 to 2003, 2006, 2012, 2013, 2014,2015
- For 12 years, the rainfall was more than 1000 mm

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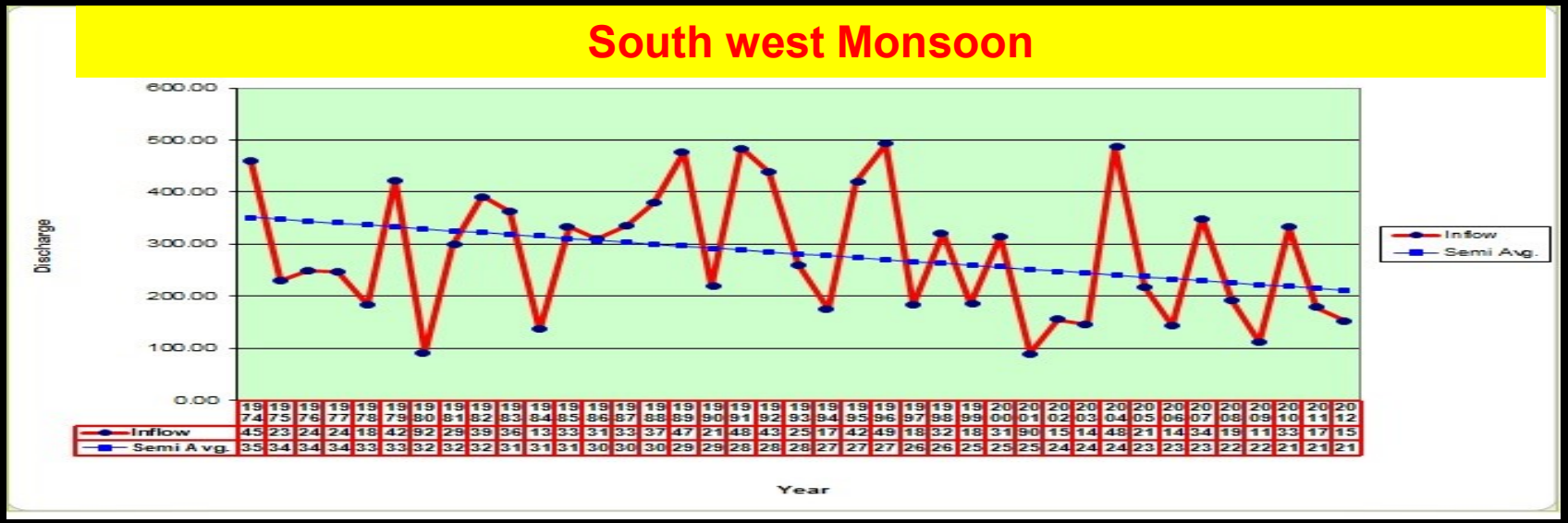

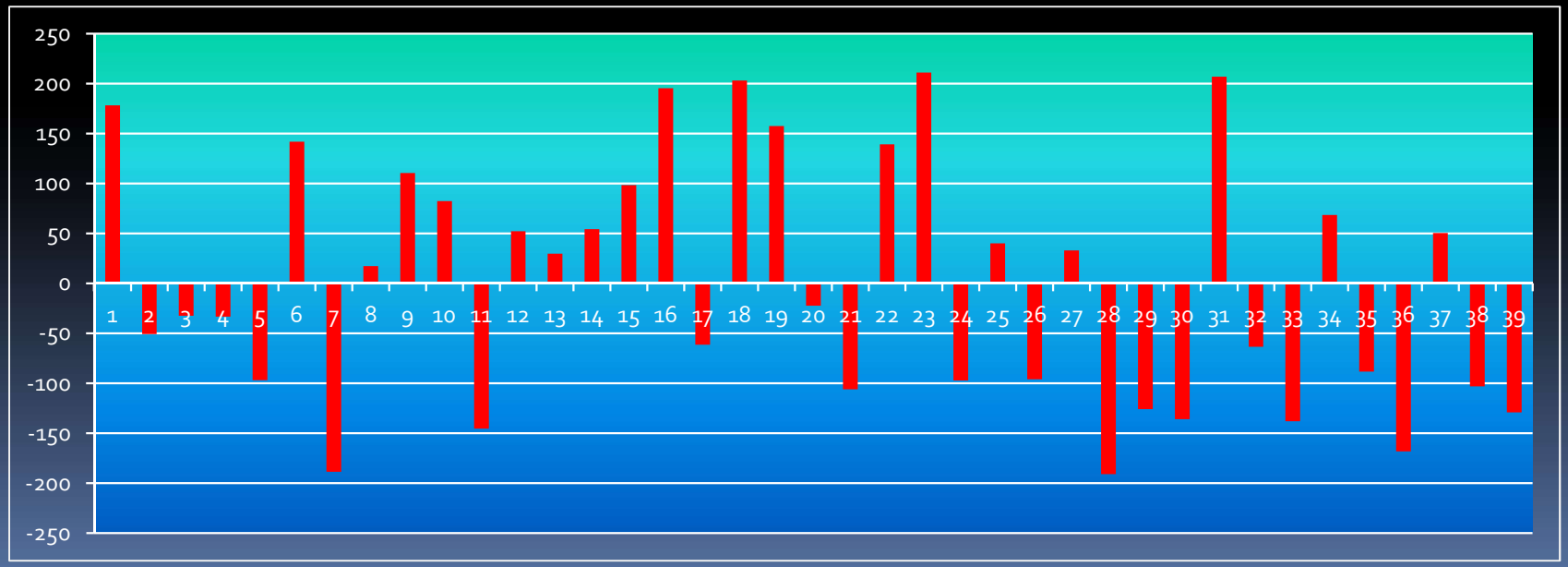

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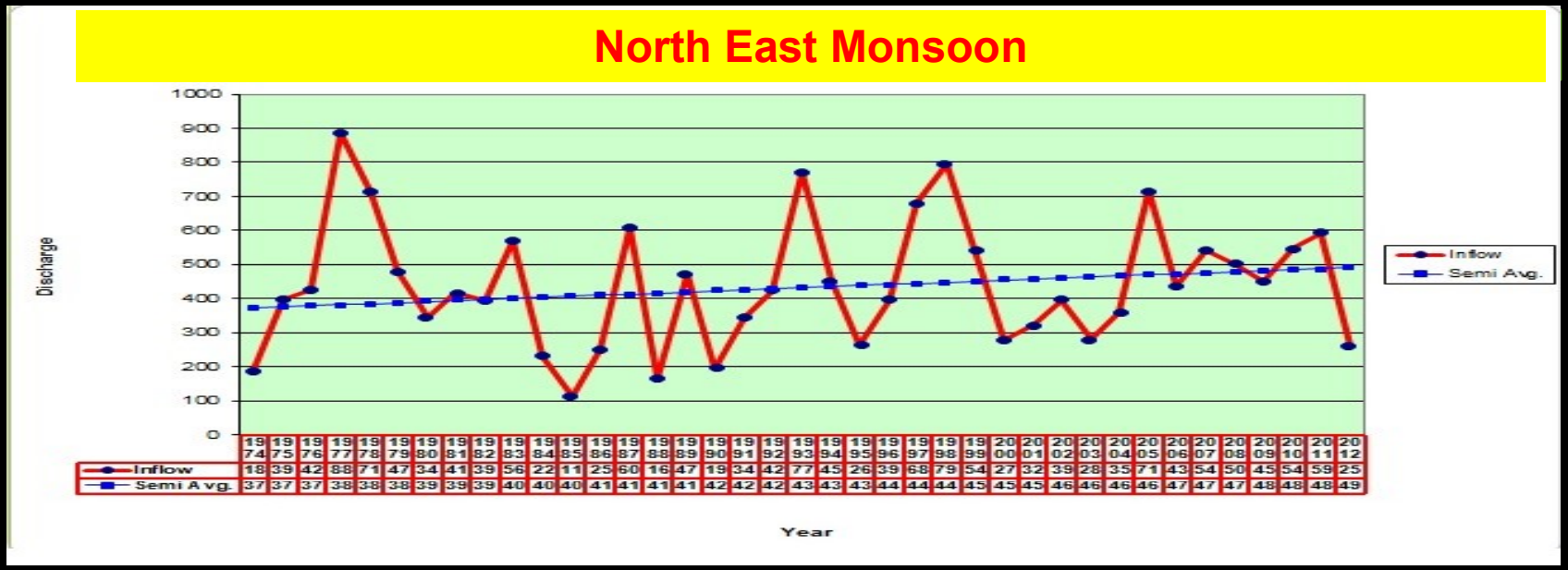

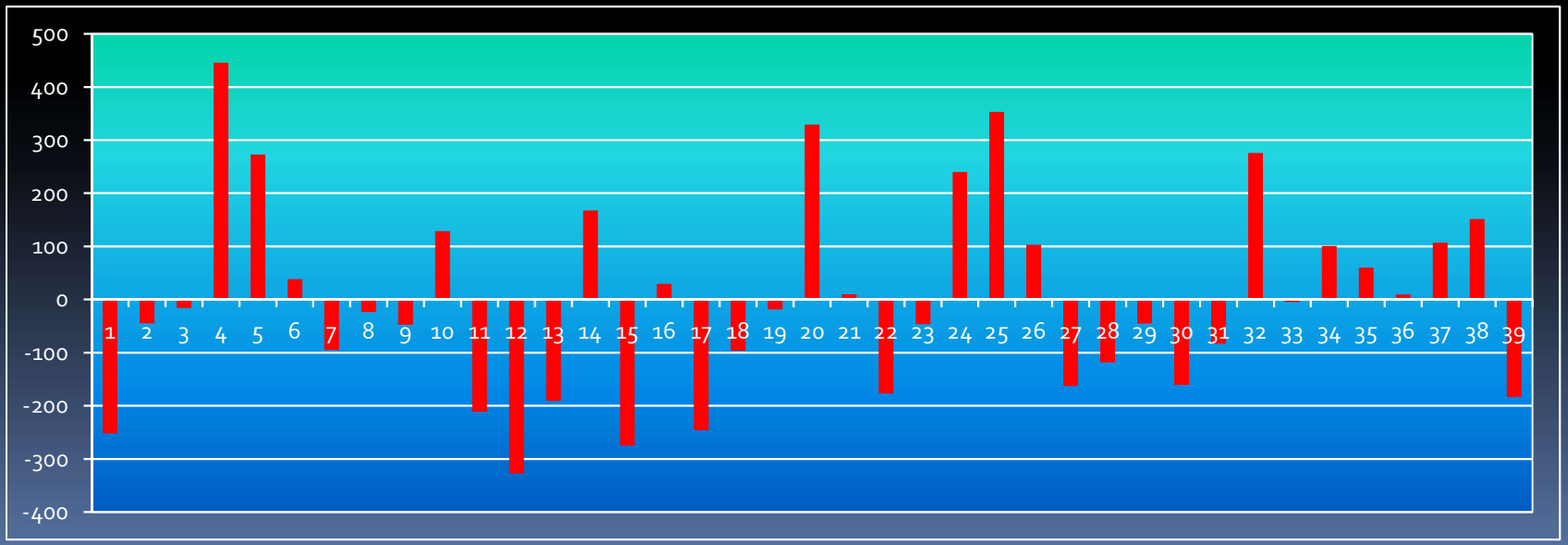

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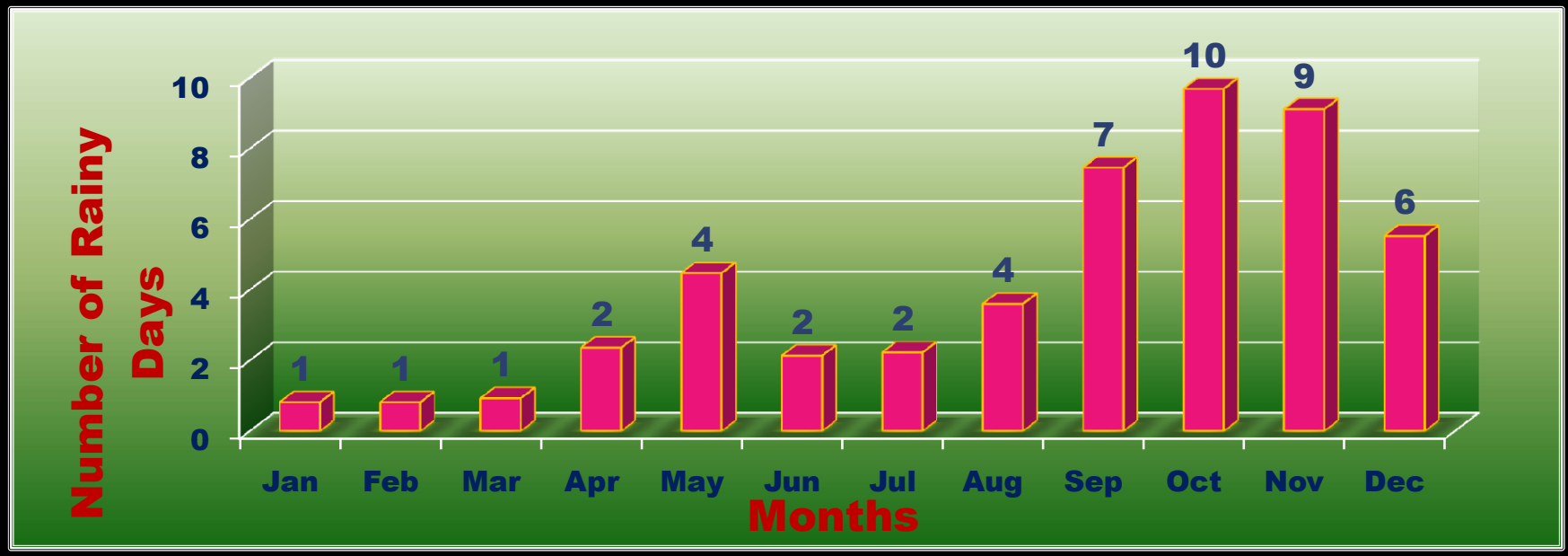

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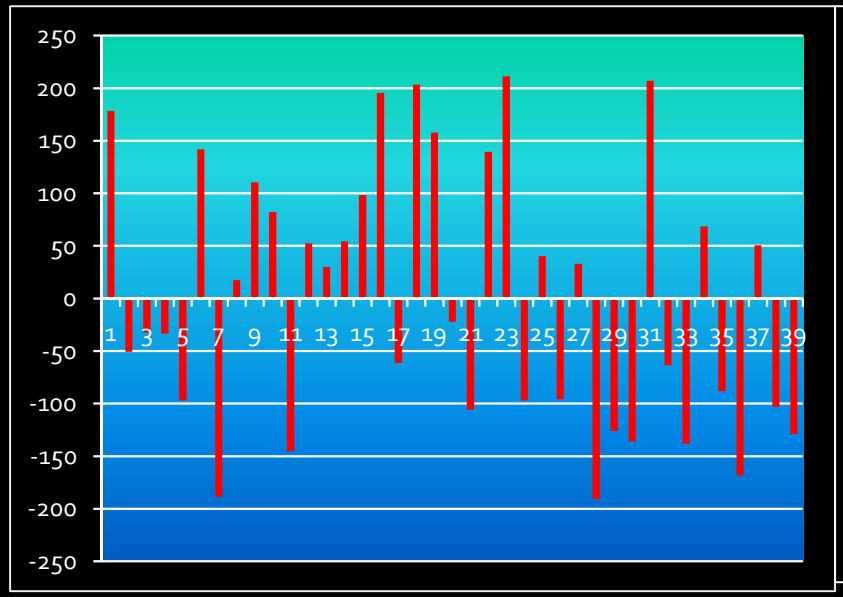
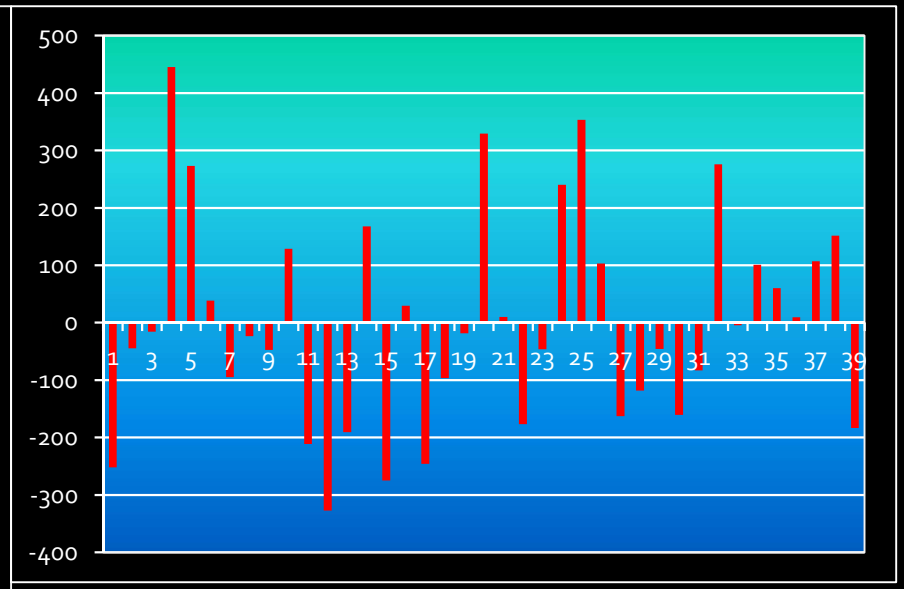
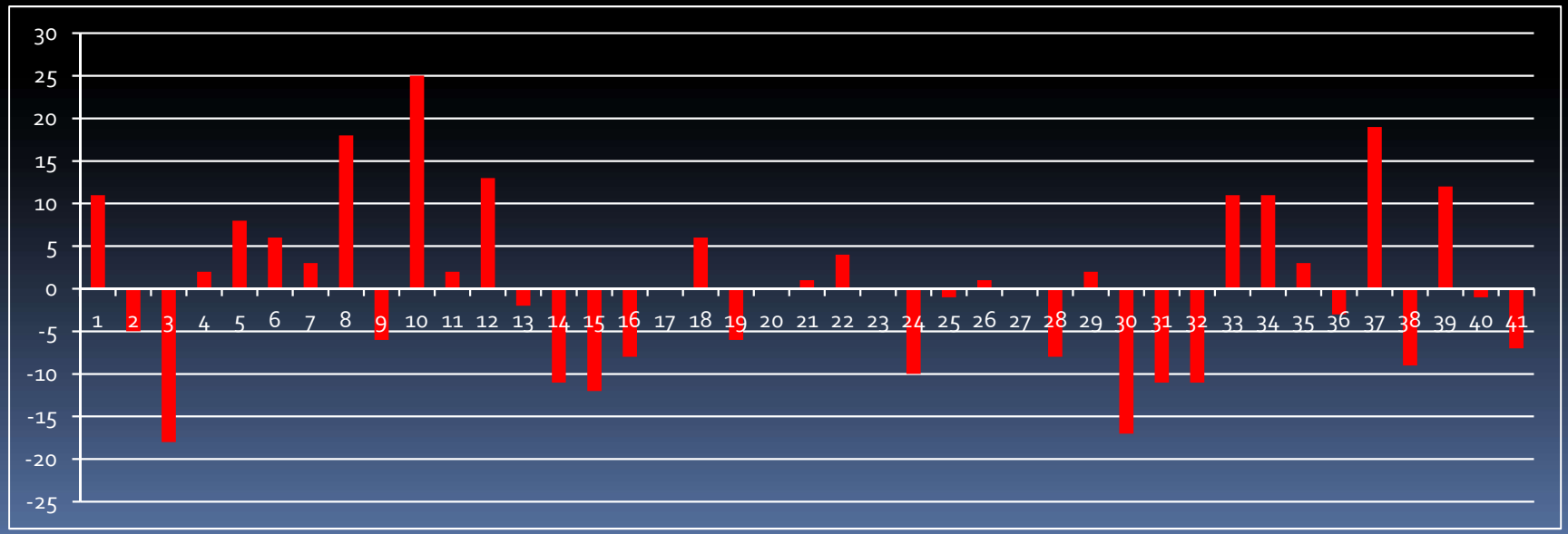
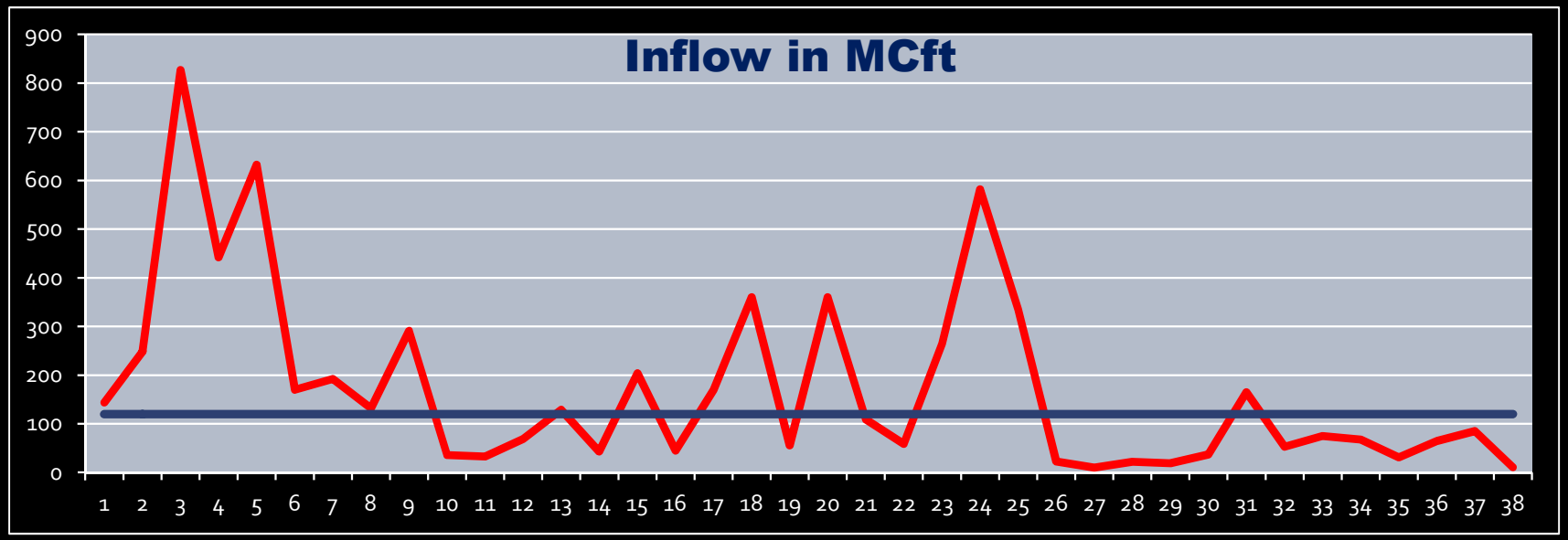
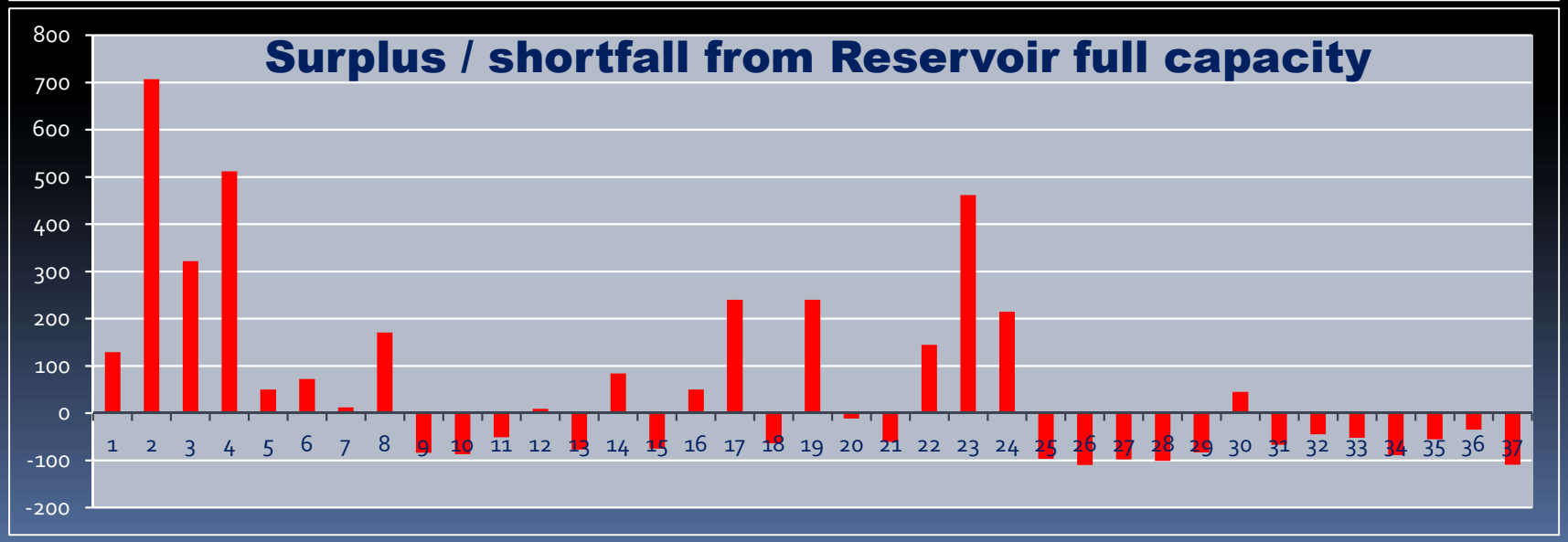






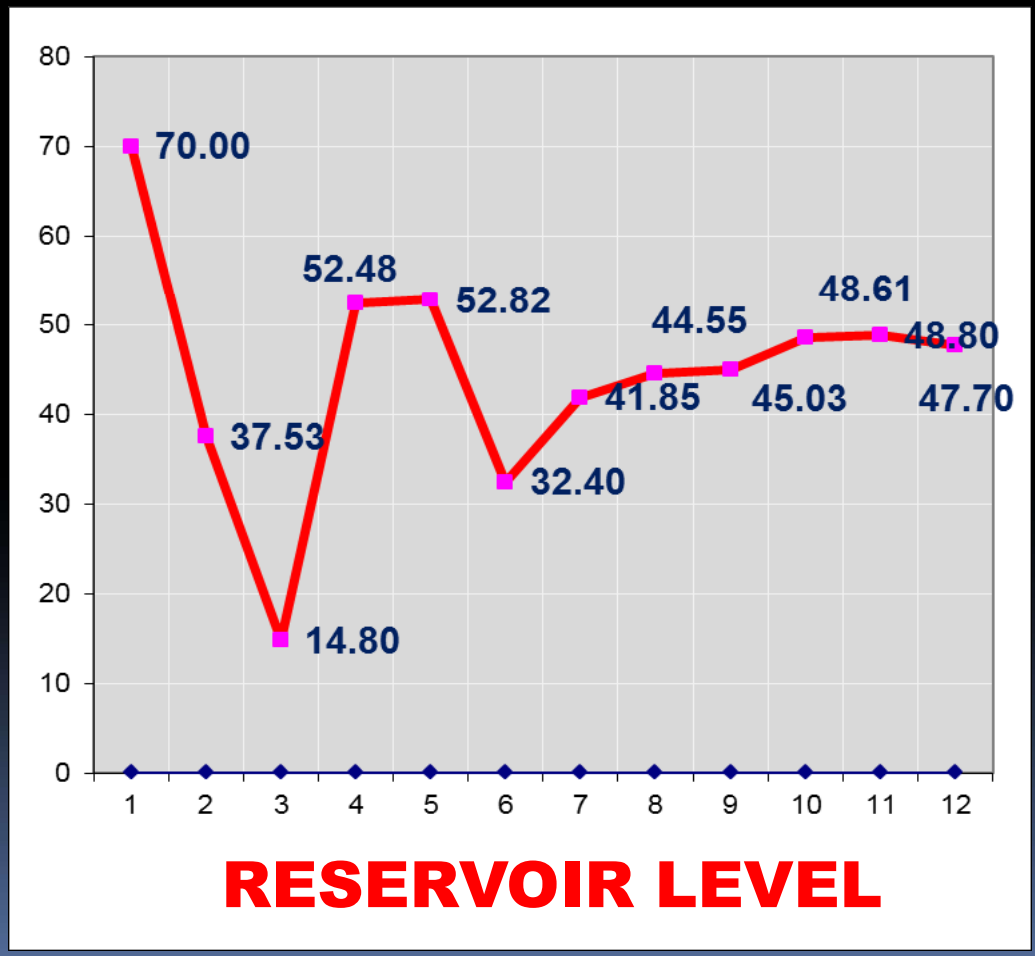
model the hydrology of the Ponnaniar Reservoir system for understanding the impact of Climate change





Supply VS. demand .....

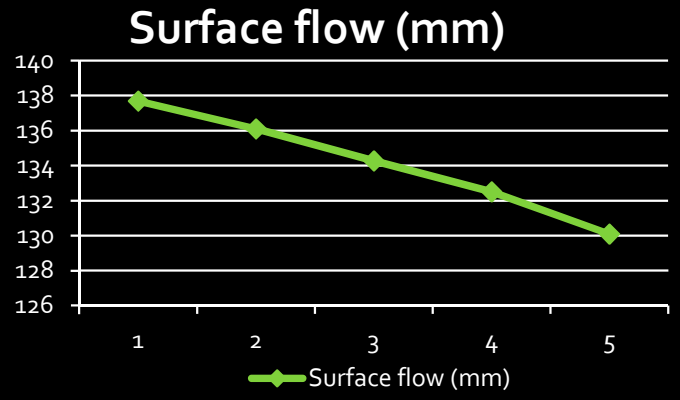
month	initial storage	demand	inflow	balance
sep	70.00	54.43	21.96	37.53
oct	37.53	56.25	33.52	14.80
nov	14.80	36.29	73.96	52.48
dec	52.48	37.50	37.84	52.82
jan	52.82	37.50	17.08	32.40
feb	32.40	3.63	13.08	41.85
mar	41.85	4.02	6.72	44.55
apr	44.55	3.89	4.36	45.03
may	45.03	4.02	7.60	48.61
jun	48.61	3.89	4.08	48.80
jul	48.80	4.02	2.92	47.70
aug	47.70	4.02	5.60	49.29

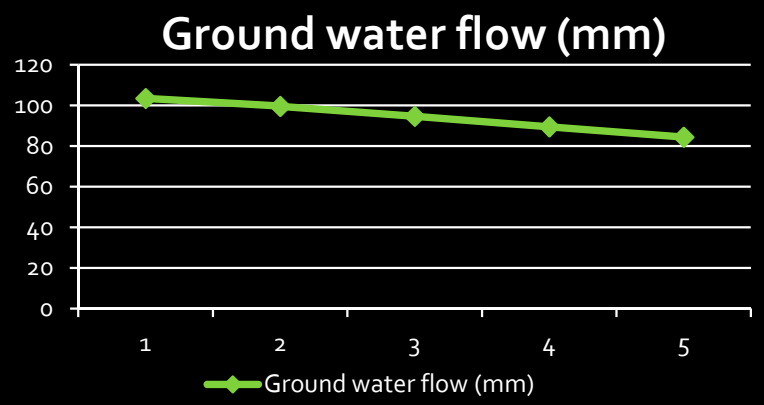


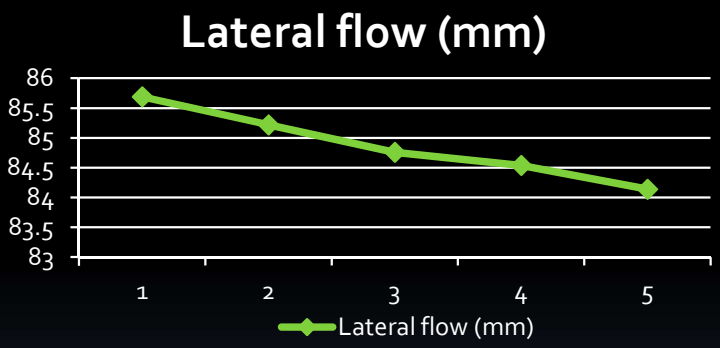
Impact of temperature on WR

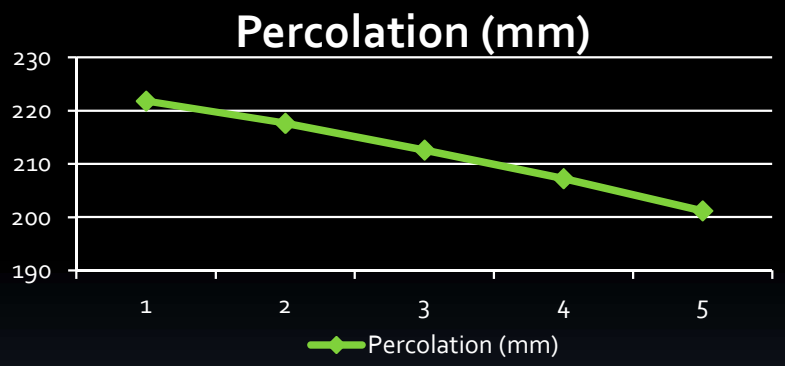
Parameters	Base year	1^0C	2^0C	3^0C	4^0C
Precipitation (mm)	967	967	967	967	967
Surface flow (mm)	137.69	136.1	134.27	132.51	130.1
Lateral flow (mm)	85.69	85.22	84.76	84.54	84.14
Ground water flow (mm)	103.49	99.59	94.71	89.53	84.41
Percolation (mm)	221.81	217.64	212.62	207.26	201.21
Soil water (mm)	52.38	52.06	51.73	51.42	51.1
Evapotranspiration (mm)	506.67	513.23	520.87	528.52	537.71
Pot. Evapotrans. (mm)	1925.4	1980.77	2036.98	2094.07	2152.06
Water yield (mm)	330.48	324.4	317.1	309.78	301.66

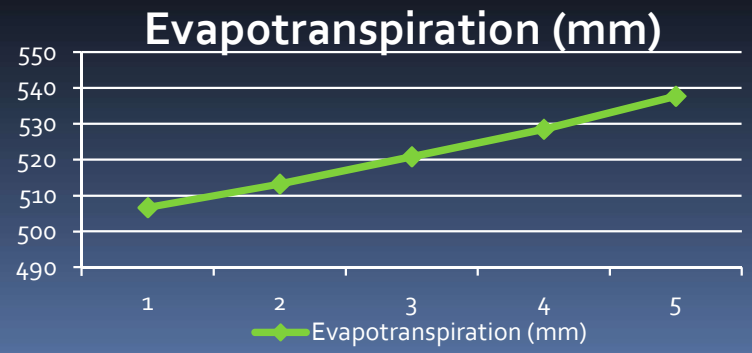
Results at a glance

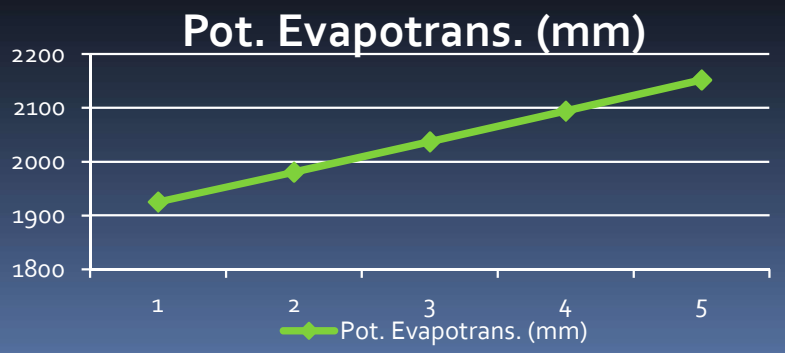








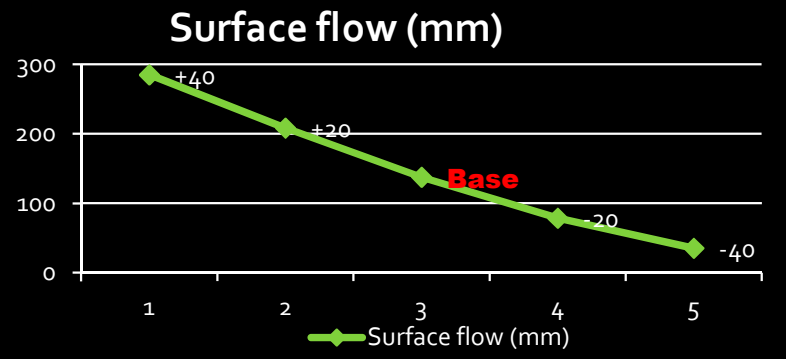


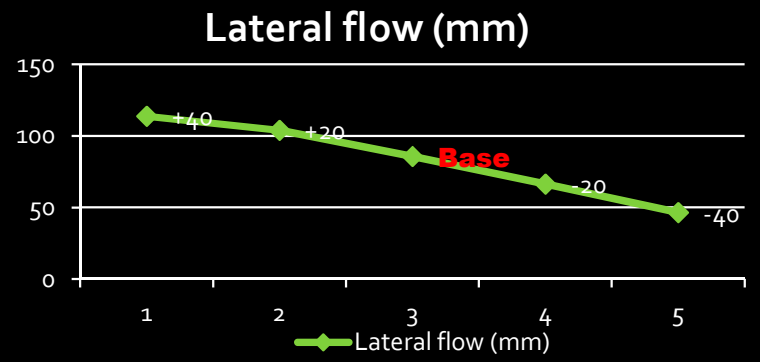


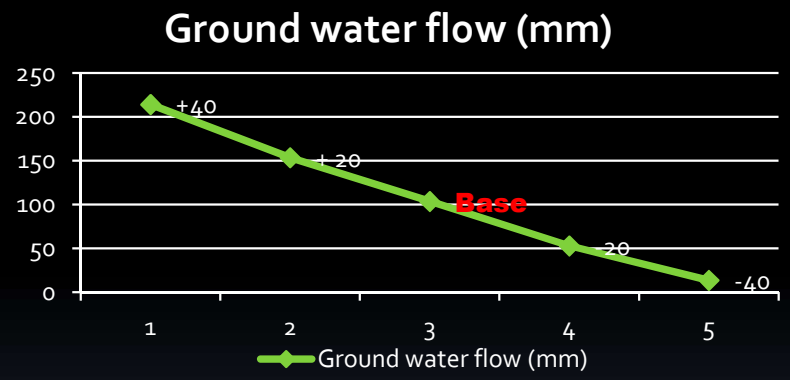
Impact of precipitation

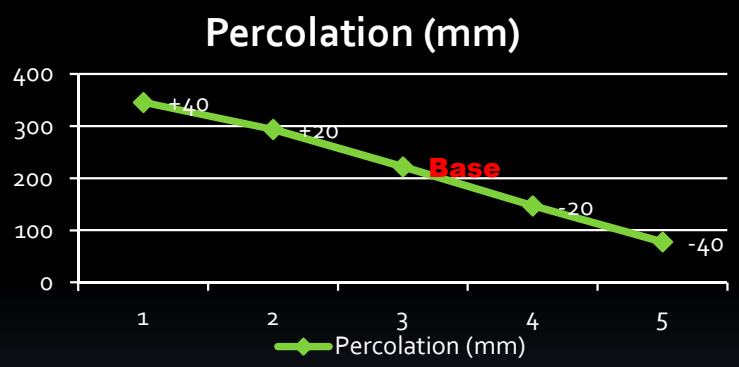
Parameters	Base	+40%	+20%	-20%	-40%
Precipitation (mm)	967	1284.36	1160.92	773.6	582.28
Surface flow (mm)	137.69	284.82	208.27	78.69	35.55
Lateral flow (mm)	85.69	113.73	103.89	66.4	46.5
G.W. flow (mm)	103.49	214.07	153.46	52.88	13.68
Percolation (mm)	221.81	345.36	293.47	147.06	78.14
Soil water (mm)	52.38	61.41	52.45	52.25	50.63
Evapotrans. (mm)	506.67	514.51	540.03	466.5	408.83
Pot. Evapotrans.(mm)	1925.4	1925.4	1925.4	1925.4	1925.4
Water yield (mm)	330.48	619.59	470.81	200.03	96.61

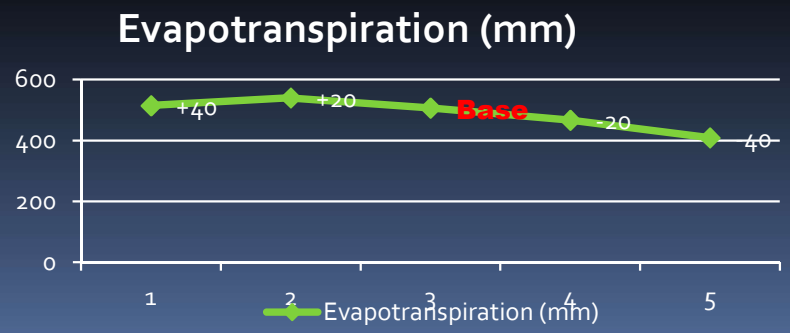
Results at a glance

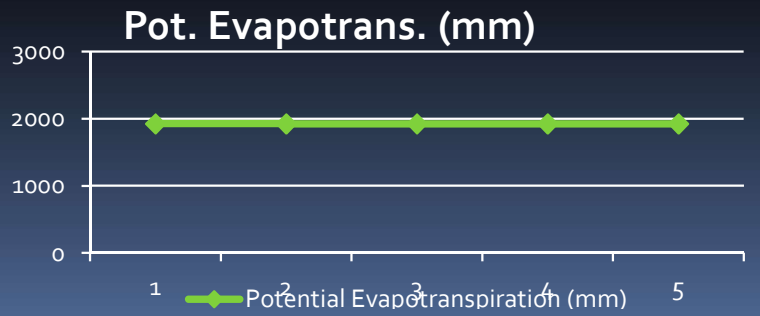








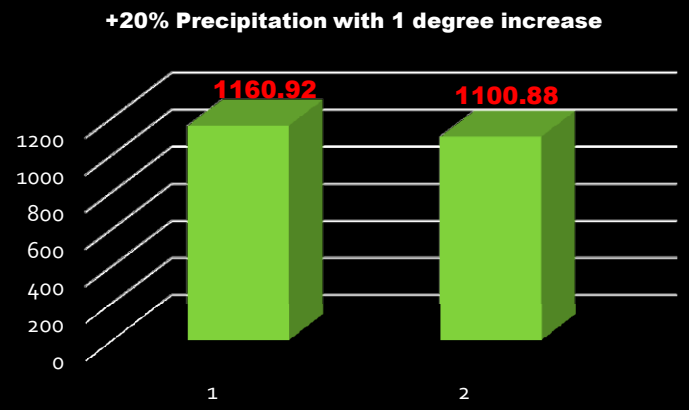


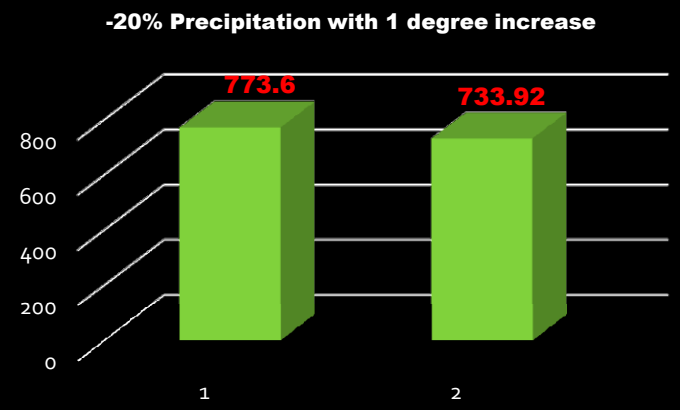


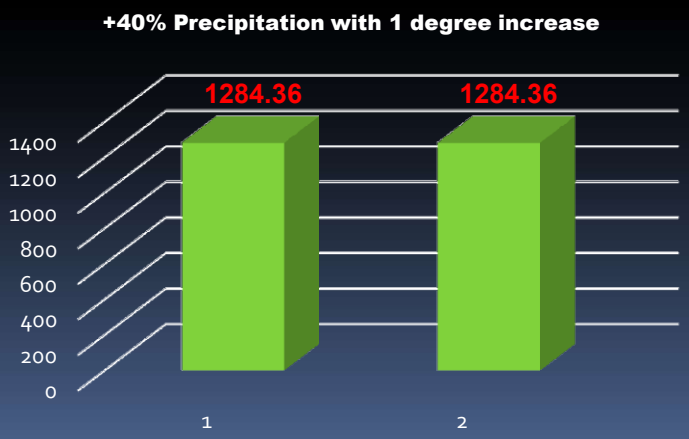
1^0 increase in temperature + varying precipitation

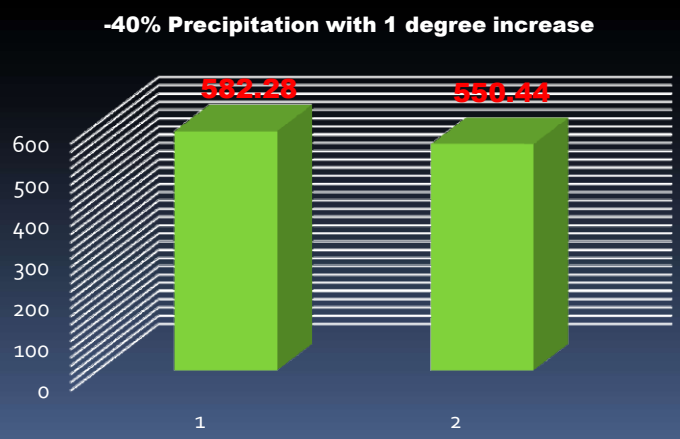
Parameters	Base	+40%	+20%	-20%	-40%
Precipitation (mm)	967	1284.36	1100.88	733.92	550.44
Surface flow (mm)	137.69	285.6	204.56	73.21	29.46
Lateral flow (mm)	85.69	113.89	97.8	62.31	43.24
G.W. flow (mm)	103.49	213.89	166.73	64.98	20.07
Percolation (mm)	221.81	344.44	275.95	129.3	63.96
Soil water (mm)	52.38	61.19	60.91	59.97	52.6
Evapotrans. (mm)	506.67	514.73	497.5	445.7	398.14
Pot. Evapotrans.(mm)	1925.4	1980.77	1980.77	1980.77	1980.77
Water yield (mm)	330.48	620.43	474.69	203.07	93.97

1^0 increase in temperature + varying precipitation

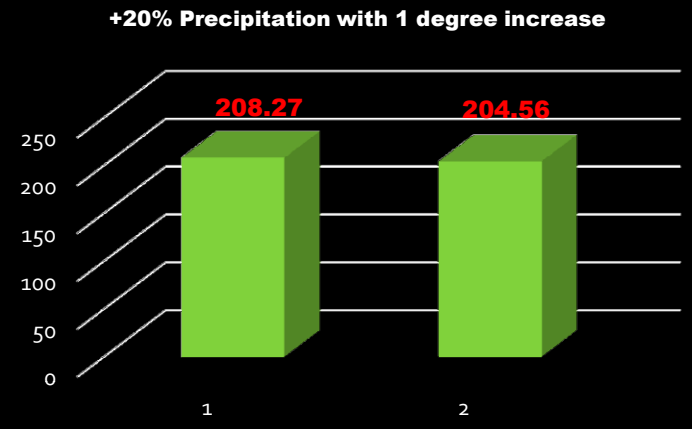


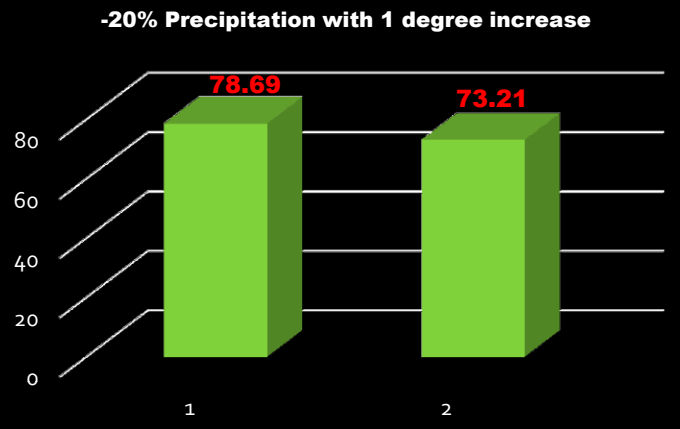


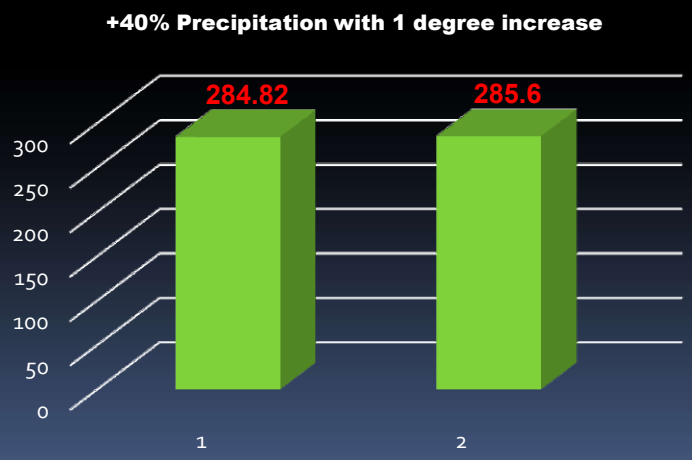


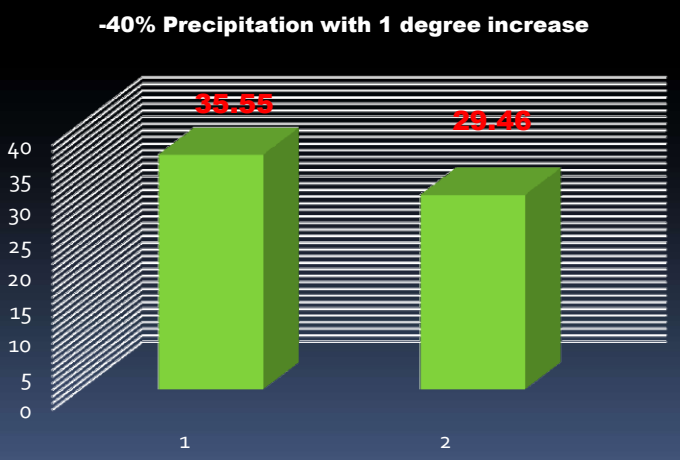


1^0 increase in temperature + varying precipitation – Surface flow









2^0 increase in temperature + varying precipitation

Parameters	Base	+40%	+20%	-20%	-40%
Precipitation (mm)	967	1284.36	1100.88	733.92	550.44
Surface flow (mm)	137.69	285.61	204.57	73.2	29.46
Lateral flow (mm)	85.69	113.89	97.8	62.31	43.24
G.W. flow (mm)	103.49	213.85	166.7	64.91	20.03
Percolation (mm)	221.81	344.37	275.89	129.22	63.92
Soil water (mm)	52.38	61.18	60.9	59.97	52.57
Evapotrans. (mm)	506.67	514.79	497.55	445.8	398.22
Pot. Evapotrans.(mm)	1925.4	1982.42	1982.42	1982.42	1982.42
Water yield (mm)	330.48	620.39	474.66	202.98	93.92

Conclusion

- The study reveals that the increase in temperature will effect in a declining trend in precipitation and surface runoff
- Lots of structural and non structural measures are to be taken to address the issue going to be faced by water resources sector.
- The possibility of converting the supply based system into demand based system is on card.

Thank You