IMPACT OF FUTURE PROJECTED CLIMATE ON THE UPPER ATHI RIVER BASIN WATER RESOURCES

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1. INTRODUCTION

The Athi River Basin has an area of 66,559km^2 and borders Tanzania to the south, the Indian Ocean coastline to the east, the Tana Basin to the north and the Rift Valley basin to the west. Athi River basin Area has varied topographical characteristics, from the highland in the Aberdare Ranges of around 2,600M above mean sea level (amyl) to the coastal area at the sea level. ARCA is classified as a semi-arid land except in the upstream area of the Athi River which is classified as a humid land non-Arid and Semi-arid Land (non-ASAL). The catchment has an annual average rainfall of 810mm. The annual rainfall differs spatially within the catchment area, ranging from around 500mm in the southern part near the border with Tanzania to 1,200mm in the western mountainous area. Evapotranspiration ranges from 1200-2500 mm per year in the catchment. Daily temperatures in the catchment area range between 10°C in the Upper Zone to 30°C in the Coastal Zone.

Although the Athi River Basin only covers about 10% of Kenya's land surface area, it has high economic activity, houses a quarter of the country's population, and hosts the two largest cities in Kenya viz. Nairobi and Mombasa. Nairobi as the capital of Kenya, is the largest and most densely populated city in the country. It has a high-water demand and receives a large portion of its water from the Tana Basin via an interbasin transfer.

Along the Athi River Catchment Area, there are 12 counties namely Nairobi, Makueni, Taita Taveta, Kwale, Mombasa, Kiambu, Machakos, Kajiado, Kilifi, Kitui and Nyandarua. The project will focus on four counties: Kenya, which are Nairobi, Kiambu, Machakos and Nyandarua. The Upper Athi project area covers the sub-basins 3AA, 3AB, 3AC, 3BA, 3BB, 3BC, 3BD, 3CB, 3DA, 3DB, 3EA, 3EB, 3EC and 3ED.

Study Objective

The objective of this study was to quantitatively assess the impact of future projected climate on the Water resources of the Upper Athi River Basin as an input to the GCF project proposal entitled 'Enhancing community resilience and water security in the Upper Athi River Catchment Area, Kenya'. To achieve this goal, the following questions guided this study:

1) What are the changes in mean annual stream flows for projected rainfall patterns and RCP's (2.5, 4.5. and 8.5) for selected scenario periods compared to the baseline
2) What is the impact on the Seasonal Flow Distribution
3) What are the changes in water availability for consumptive use and associated deficits
4) What is the impact of projected climate on water availability for existing infrastructure that is earmarked for rehabilitation and/or expansion?

2. SUB BASIN WATER BALANCE ANALYSIS

2.1 The Study area sub basins

There are 14 sub basins in the upper Athi River Basin, these are 3AA, 3AB, 3AC, 3BA, 3BB, 3BC, 3BD, 3CB, 3DA, 3DB, 3EA, 3EB, 3EC and 3ED (Figure 1)

Figure 1: Delineated Sub Basins of the Upper Athi River Basin

Catchment Delineation

Catchment delineation for the Athi Basin was undertaken in the Mike Hydro model using hydrologically correct 90m DEM. The delineation was undertaken in two stages as follows; The WRA sub catchments were delineated in the first instance followed by catchment delineation at the selected river gauging stations. The Figure 1 shows the delineated catchments for the Athi basin.

2.2 Baseline Data Availability and Processing

Rainfall and potential evapotranspiration are necessary data to run the hydrological models, observed river discharge and water use data are needed to calibrate the model and assess the impact of flow variability and change. In case of precipitation and evaporation at least 30 years daily data was required to run the model for the baseline scenario. Due to lack of observed daily data for precipitation and evaporation or temperature coupled with the fact that the area has low density of gauge stations necessitated use of alternative data sets.

Precipitation

This study used CHIRPS (Climate Hazards Group Infra-Red Precipitation with Station) data n (Funk *et al*., 2015). This precipitation data starts from 1981 to date at spatial resolution of 0.05^{o} and 0.25 ^{o} (approximately 5 and 25km over the Equator) and at daily 5 & 10 days and monthly time steps. It incorporates infra-red satellite imagery blended with ground observation (where available) to create the gridded rainfall. This data has been quality controlled before release and is freely available to the public. Using the CHIRPS daily precipitation data, Catchment areal average daily rainfall was produced for the period 1981-2010 for the modelled sub catchments.

Potential Evapotranspiration

Reference Penman-Montieth evapotranspiration from the TerraClimate datasets was used as the input Potential ET. TerraClimate is a dataset of monthly climate and climatic water balance for global terrestrial surfaces produced by the Climatology Lab of the University of Carlifornia (Abatzoglou *et al., 2018*). The Reference PET data has monthly temporal resolution and a ~4-km (1/24th degree) spatial resolution. Catchment areal average monthly PET was produced for the period 1981-2010 for the modelled sub catchments.

River Discharge

From the set of river discharge data provided by the Kenya Water Resources Authority four stations which cover the upper Athi basin and have reasonable length of time and quality were selected for calibrating the model (Table 1); the assessment involved river gauging station in the study area which had data for the period 1981-2010. The river discharge data were naturalized by adding the water abstracted/diverted upstream of each station.

Table 1: Selected streamflow gauges for model calibration and validation

NO	Code	NAME	LAT (°)	LON (°)
1	3BB12	KAMITI	-1.20	36.97
2	3CB05	NDARUGU	-1.13	37.16
3	3DA02	ATHI MUNYU	-1.09	37.19
4	3F02	ATHI MAVINDINI	-1.79	37.85

Water Use/ Abstraction Data
Water abstraction permit data was also provided for the study basins by the Water Resources Authority, this gives information on amount permitted for abstraction per basin and sub-basin. This data was used for naturalizing the river flows and also assessing the impact of river flow variability and change due to climate change.

Future Climate Data
Climate were based three on representative concentration pathways—RCP8.5, 4.5 and 2.6.The model used for this study is the Rossby Centre regional atmospheric model (RCA4 with a horizontal grid spacing of the simulation is 0.44 degrees (about 50 kilometers). The choice of the RCA model for this analysis was based mainly on the availability of the model outputs for the three different scenarios (RCP2.6, RCP4.5, and RCP8.5), as well as recent study (Endris et al., 2015) showing that the RCA model run driven by MPI-ESM-LR better reproduces the large-scale signals, such as the El Niño-Southern Oscillation and the Indian Ocean Dipole, in the historical period over the Eastern Africa region than RCA model runs driven by the other global climate models.

The Rossby Centre regional atmospheric model (RCA4) output for the baseline period was evaluated against the CHIRPS datasets. Figure 2 shows the areal average precipitation at monthly interval and the accumulated precipitation for the two datasets. As shown in Figure 2 the two datasets have good agreement over the baseline period

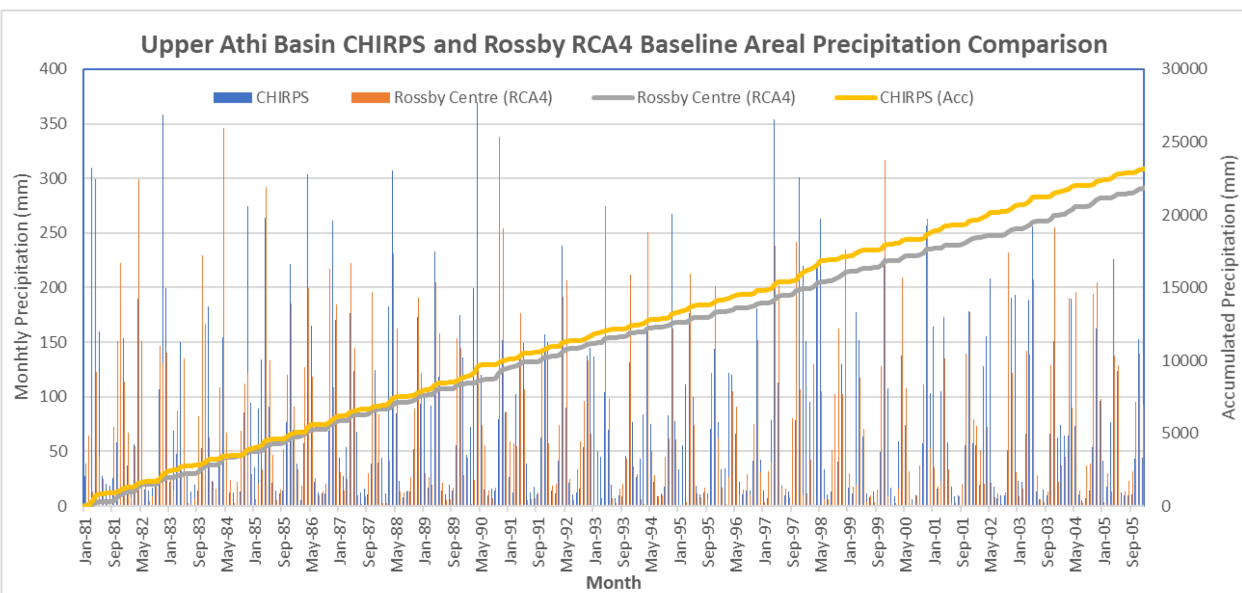

Figure 2 Comparison between Rossby Regional atmospheric Model (RCA4) and CHIRPS datasets

2.3 Selection of Study Periods

Due to the period of data availability the period for analysis for this study was set as 1981-2010. This 30-year period is considered as the baseline against which future periods (scenarios) will be assessed.

The future periods are as follows:

- Current (CU): 2011- 2040
- Near Future (NF): 2041- 2070
- Far Future (FF): 2071- 2100

2.4 Modelling Methodology

This study involved the following steps

- Processing of the Regional climate model to extract precipitation and PET data for the three scenarios rcp 2.5, 4.5 and 8.5 for the reference period 1981-2100
- Estimation of Delta-change factors for three future periods, the "Current" 2011-2040, "near future" 2041-2070 and the "far future" 2071-2100 using 1981-2010 as the reference period.
- Setting up of a Mike-Hydro/NAM rainfall runoff model for the 14 sub basins.
- Calibration and validation of the Mike-Hydro/NAM for the period 1981-2010
- Production of new input data for the three scenarios and three future periods using the remotely sensed/observed data and delta change factors. This makes nine input data sets.
- Running of the calibrated & validated Mike hydro/NAM model using the nine datasets for the three scenarios and three periods as input data.
- Assessment of the results on aspects such as changes in flow regime and impact on water users and uses in the catchments

Generation of future period input time-series

The Delta-change factors and input data for the baseline were used to produce model input data for the three future periods of near, mid and far. The baseline data is multiplied by the calculated Delta-change factors to generate a new set of precipitation and PET data for each of the future period and climate scenarios of RCP 26, 45 and 85. A total of 12 data sets were thus generated and thus 12 rainfall-runoff simulations were undertaken**.**

Setting up and Calibration of a Mike-Hydro/NAM rainfall runoff NAM Model

The NAM stands for **N**edbør **A**fløbs **M**odel (in Danish) and means a rainfall-runoff model; it is a lumped conceptual hydrological model and is one of the available modules in the Mike-Hydro model. It simulates the rainfall-runoff processes that occur in the catchment as shown in Figure 3 and its outputs can be directly used in the Water Resources or hydrodynamic module of the Mike-Hydro. Structurally the model represented by four storages: at the top is snow storage followed by upper storage then lower storage and then groundwater storage. The model simulates the rainfall-runoff process by accounting for the water content in each of the four storages which are mutually inter-related. NAM also allows river withdrawals for irrigation or municipal water.

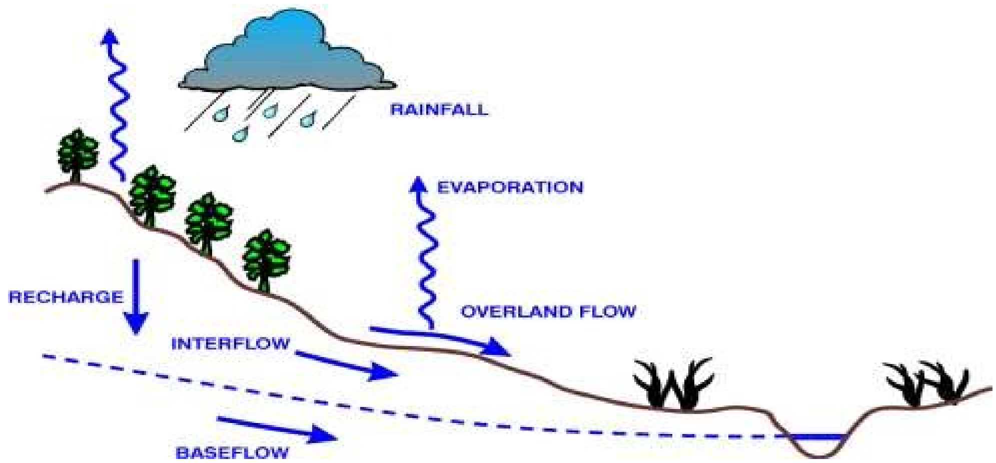

Figure 3: NAM / MIKE 11 RR modeled processes

The NAM model data requirements are precipitation, Potential ET and if snowmelt is modeled then temperature data is also required to run the model. For calibration and validation purposes observed stream flow is also necessary. The output from the model area time-series of catchment runoff consisting of; overland flow, interflow and groundwater recharge which are also available as time-series.

Model setup

As mentioned earlier, the Upper Athi sub basins were delineated as the first step in setting up the model. The Mike-Hydro model's catchment delineation module was used with 90m DEM. Baseline input time series (precipitation and PET) was prepared for each catchment and data loaded in to the Mike-Hydro. The simulation period was fixed as Jan.1 1981 -31Dec 2010. Figure 4 show a screenshot of model.

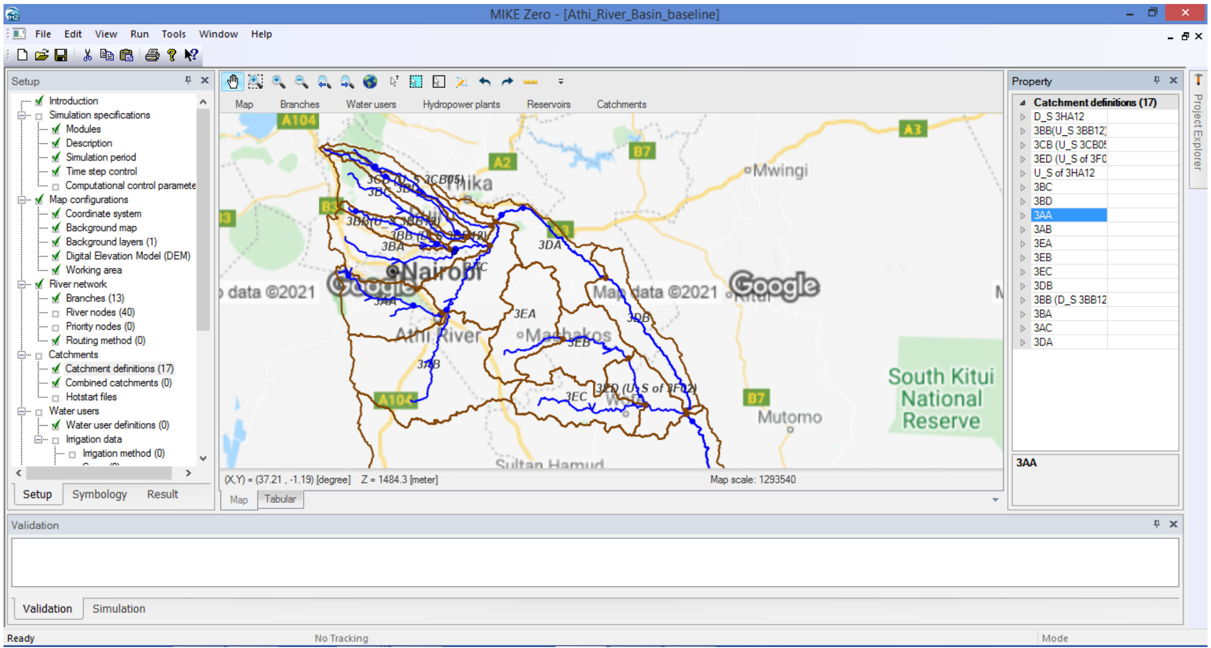

Figure 4: Screenshot of the Upper Athi River Basin Mike Hydro model

Model Calibration and Validation

Model calibration involves adjustment of model catchment parameters until a good fit between the model catchment runoff and observed river flow is achieved. In the case of NAM model the parameters that are adjusted are shown in Table 2.

Table 2: NAM Adjusted Parameters

Parameter	Description	Effects
Umax	Maximum water content in surface storage	Overland flow, infiltration, evapotranspiration, interflow
Lmax	Maximum water content in lower zone/root storage	Overland flow, infiltration, evapotranspiration, base flow
CQOF	Overland flow coefficient	Volume of overland flow and infiltration
CKIF	Interflow drainage constant	Drainage of surface storage as interflow
TOF	Overland flow threshold	Soil moisture demand that must be satisfied for overland flow to occur
TIF	Interflow threshold	Soil moisture demand that must be satisfied for interflow to occur

Parameter	Description	Effects
TG	Groundwater recharge threshold	Soil moisture demand that must be satisfied for groundwater recharge to occur
CK1	Timing constant for overland flow	Routing overland flow along catchment slopes and channels
CK2	Timing constant for interflow	Routing interflow along catchment slopes
CK_{BF}	Timing constant for base flow	Routing recharge through linear groundwater recharge

Calibration and validation was undertaken at the selected river gauging stations using a split approach by dividing the streamflow data in to two periods and using one for calibration and the other for validation as indicated in Table 2.4. Correlation co-efficient (R^2), Nash-Sutcliffe Co-efficient of efficiency (NSCE) and Water Balance Error (WBE) was used as a calibration/validation criterion. The criteria value for a perfect model is 1 for both R^2 and NSCE and 0 (zero) for WBE.

Table 3: Calibration and Validation periods for the Upper Athi Basin Model

No	River Gauging Station Code	Calibration Period	Validation Period
1	3BB12	1987-1990	1991-1994
2	3CB05	1981-1987	1988-1994
3	3DA02	1981-1987	1988-1994
4	3F02	1981-1985	1986-1990

Water Allocation Modelling: In order to assess the impact of water resources availability on key socioeconomic activities, water users were included in the previously set up model prior to calibration. Due to the fact that the lifespan of the proposed infrastructure fall in the current period (2011-2040) and also due to the uncertainty in estimating future demands water allocation modelling was carried out for the baseline and current periods only.

Two categories of water users, domestic/municipal/industrial and irrigation were included based on data from the Water Resources Authority (WRA) for the baseline period and data from the National Water Master Plan 2030 (JICA, 2013) for the current period (2011-2041). In terms of priority for water supply the first group domestic/municipal/industrial takes priority over irrigation. For ease of modelling both categories are assumed to be fully consumptive with no return flows as waste water or drainage back in to the river system.

Table 4 Water Demand to be extracted from the Upper Athi streams in 2030 (MCM/year). (Source: NWMP 2030)

Category of Demand/sub basin	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Domestic, municipal and Industrial	12.4	0.4	0.4	68.2	6.6	15.9	4.5	13	30.7	0.4	8.8	0.5	1.7	0.3
Irrigation	13.4	13.8	3.1	13.5	7.1	13.7	6.4	13.6	39.5	6.8	5.6	5.1	5	4.2

3. RESULTS AND DISCUSSION

3.1 Calibration and Validation Performance

Simulated streamflow sequences were calibrated against naturalised observed flow records through the iterative adjustment of the NAM model parameters until the best fit between the simulated and observed flow records was within acceptable standards. Best fit was assessed based on graphical comparison of daily, monthly and cumulative time series, while considering, correlation co-efficient (R^2), the Nash-Sutcliffe coefficient of efficiency (NCSE) and water balance error (WBE) criteria values. Calibration criteria performance is shown in Table 5 and examples of calibration plot is shown in Figure 5-8. The simulation results are deemed acceptable considering also that there were several gaps in the data.

Table 5: Calibration and Validation Results

Gauge	Criteria	Daily		Monthly	
		Calibration	**Validation**	**Calibration**	**Validation**
3BB12	R^2	0.41	0.40	0.70	0.57
	NSE	0.41	0.45	0.57	0.67
	WBE (%)	12.2	-1.9	12.7	8.9
3CB05	R^2	0.21	0.22	0.34	0.30
	NSE	0.18	-0.75	0.26	-1.38
	WBE (%)	-0.2	3.4	1.0	-4.3
3DA02	R^2	0.42	0.34	0.72	0.53
	NSE	0.45	0.30	0.75	0.59
	WBE (%)	6.03	-17.94	3.52	-18.74
3F02	R^2	0.34	0.29	0.58	0.19
	NSE	0.49	0.45	0.66	0.44
	WBE (%)	19.21	10.40	12.18	3.24

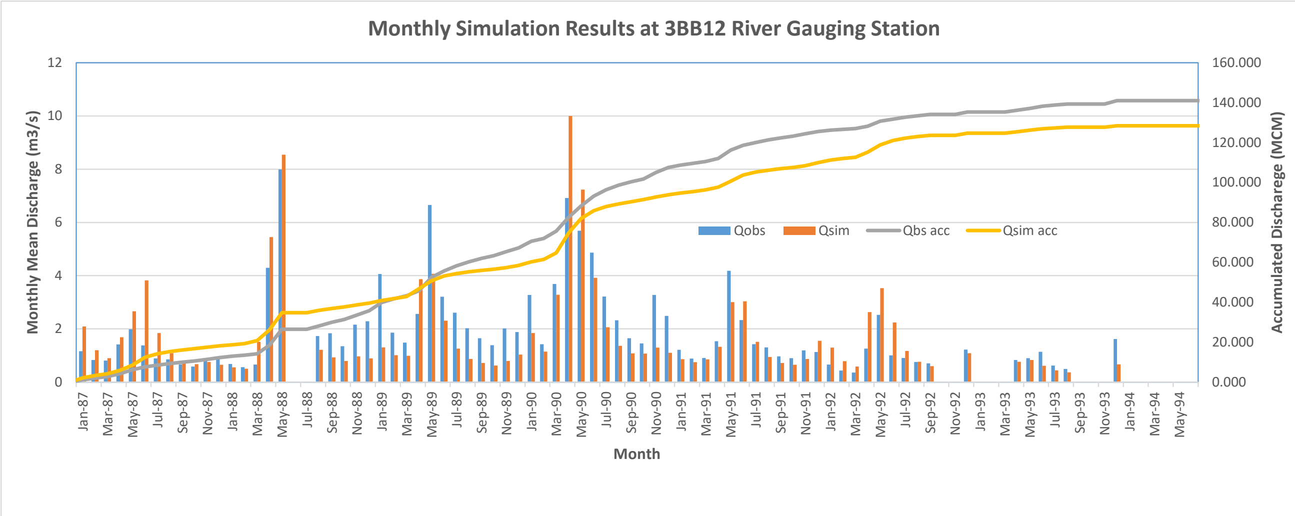

Figure 5: Monthly Calibration and Validation Simulation Plot for 3BB12 Gauging Station

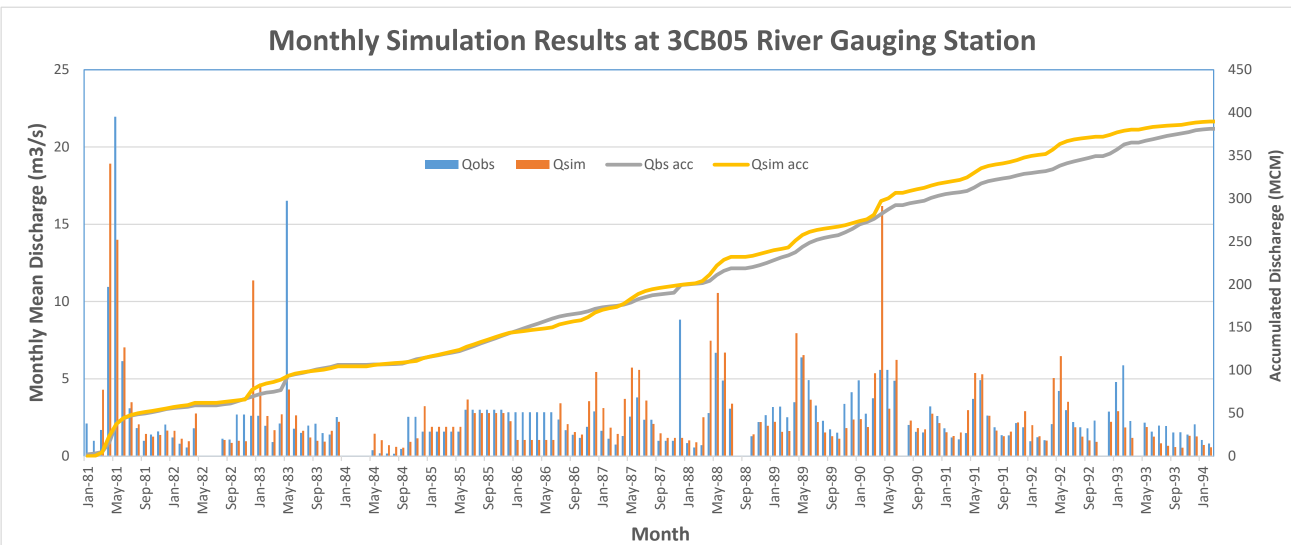

Figure 6: Monthly Calibration and Validation Simulation Plot for 3CB05 Gauging Station

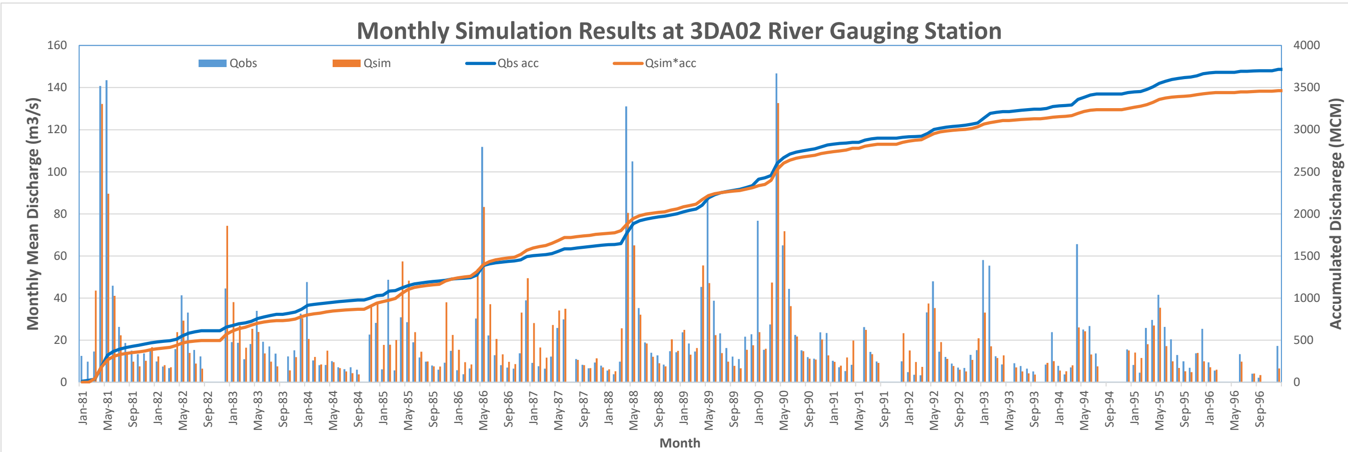

Figure 7: Monthly Calibration and Validation Simulation Plot for 3DA02 Gauging Station

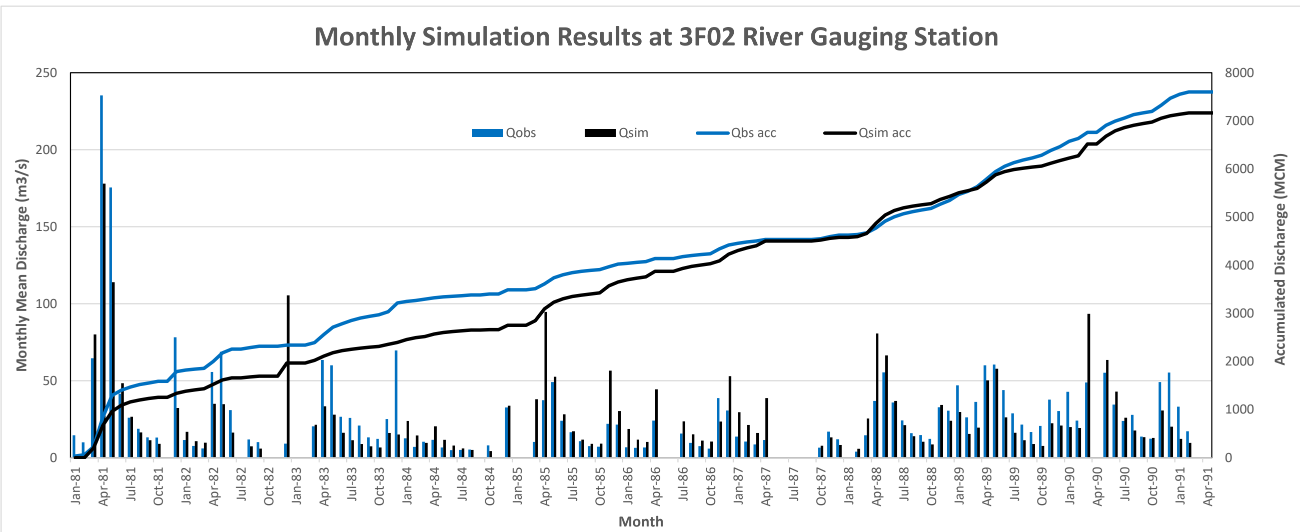

Figure 8: Monthly Calibration and Validation Simulation Plot for 3F02 Gauging Station

3.2 Impact on Water Availability/Water balance

Figure 9, shows the changes in long term mean flow for the various sub basins under different climate change scenarios and period. Generally most streams show an increasing trend in water availability in predicted future climates with a few exceptions. It is also noteworthy that in most rivers the CU-rcp2.6 scenario shows a reducing trend in water resources availability. Flows in rcp8.5 for far future flows indicate highly enhanced flows for all the sub basins which sub basin 3BA predicted to double compared to the baseline.

Streamflow simulation indicate that the flows of the upper Athi basin exhibit two peaks following the two rainy seasons. In the period 2011-2040 rcp2.6 scenario indicate a reduction of flow while other two scenarios show a slight increase in flows compared to the baseline. This is possibly as a results of increased PET having a higher effect than the increase in precipitation in the rcp2.6 scenario. For the rest of the periods of near future (2041-2070) and far future (2071-2100), the results indicate that all scenarios will result in increased streamflow.

Predicted higher streamflows will result in increased incidences of flash flooding especially in areas with steep slopes. This will not only negatively have impacts infrastructure but also results in immediate water quality deterioration. Although not directly studied here, increased rainfall will result in higher erosion and sediments in the streams. This will have consequences in water supply and storage facilities and public health. More cost will be necessary to treat water while storage facilities will need frequent maintenance to remove deposited sediment.

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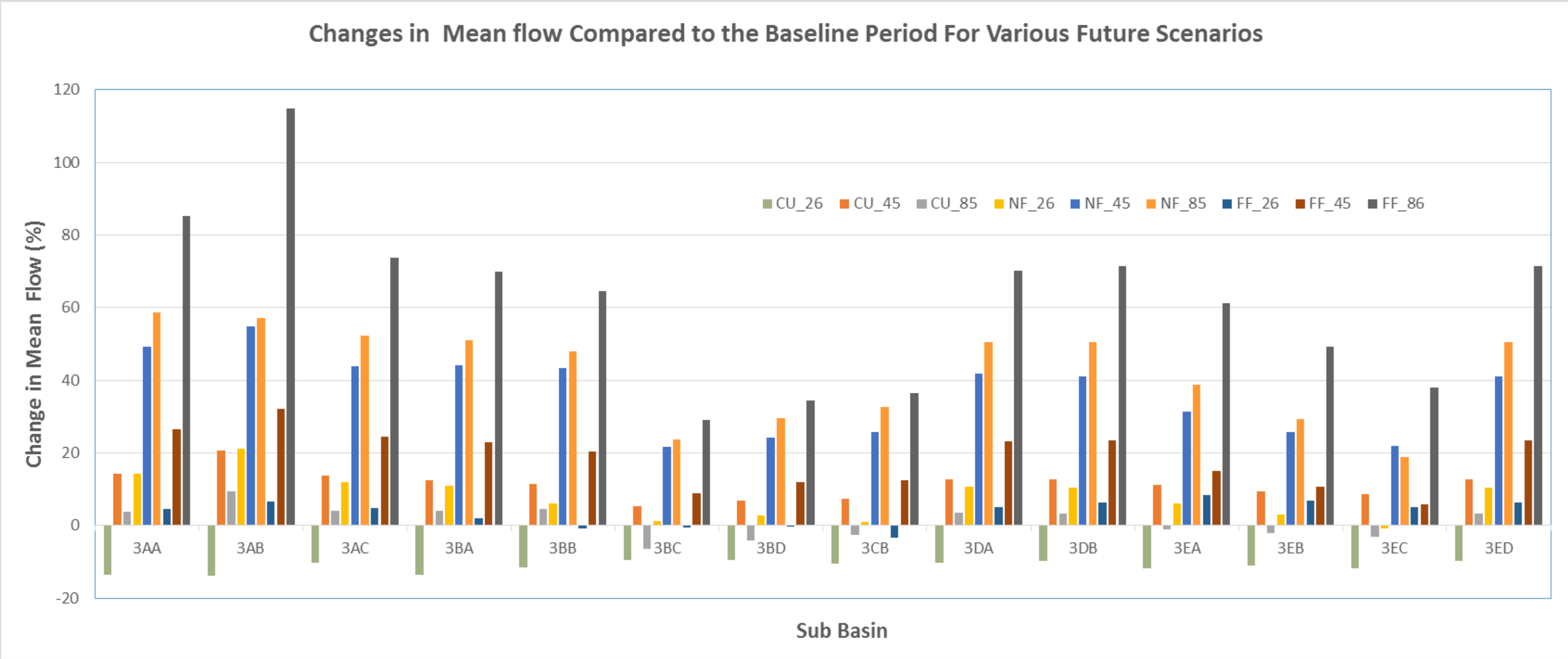

Figure 9: Changes in mean streamflow for various Upper Athi sub basins corresponding to Baseline and Future climate scenarios

3.2 Impact on the seasonal flow distribution

Figure 10, shows the monthly streamflow simulation results for sub basin 3AA, the results for the other sub basins are shown in the Annex A. All the Sub basins in the Upper Athi River Basin streamflow exhibit two peaks related to the two rainy seasons. The simulation results for the upper Athi basin using future projected climate indicate an increase in the flows from November to March. All the scenarios show that the future flows are likely to be above the baseline for this period whereas two scenarios are below the baseline for the period April and May. This indicates that the 'short rain' seasons will likely extend to the normally dry months of January to March and form a 'long rain' season. Scenario of far future for rcp8.5 indicates flows in December higher than the normal peak flows of April-May season.

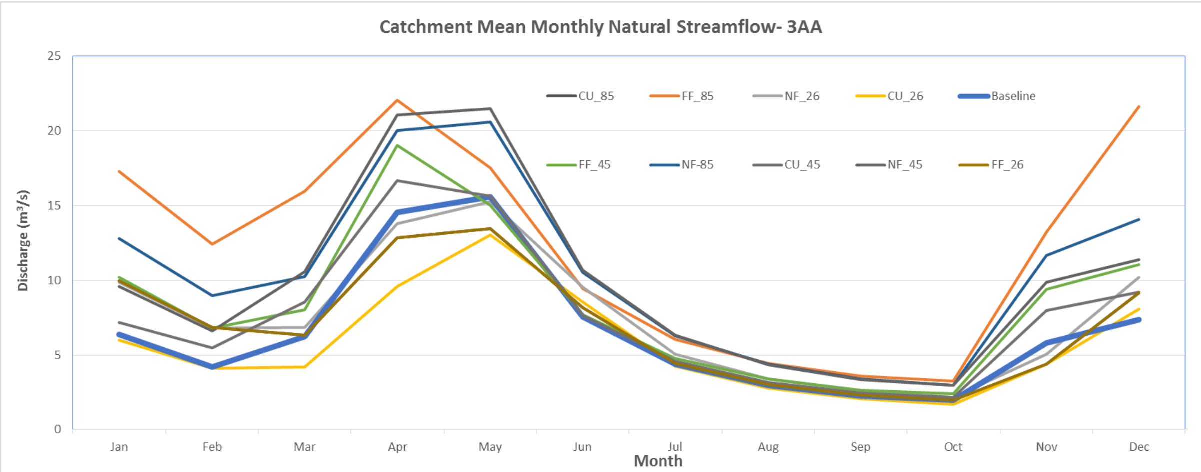

Figure 10: Sub basin 3AA Mean Monthly Streamflow under different Climate Scenarios

3.3 Impact on the Water Demand

The upper Athi Basin will likely continue to face water demand deficits in the future, the water balance situation will deteriorate in the sub basins 3BA, 3BB, 3CB, 3DA. 3EA and 3ED. As shown in Figure 10, higher water shortage level will be experienced for irrigation water use than for the domestic and municipal water use due to higher priority of the later. In these sub basins the irrigation water shortage will more than double compared to the baseline.

At the seasonal scale (Figure 12), the water demand deficit will mainly occur in the months of January –March and August-October. These are the dry months that experience low flows. It is important to note that though the flows in January-March are expected to increase in future, for the case of the upper Athi, this increase will not be able to cover future demands. While near and far future period are projected to have increased flows, water demand will be expected to increase leading to a tight water balance and higher water demand deficits. The deficit may be higher if the projected demands are overshot particularly with accelerated irrigation development.

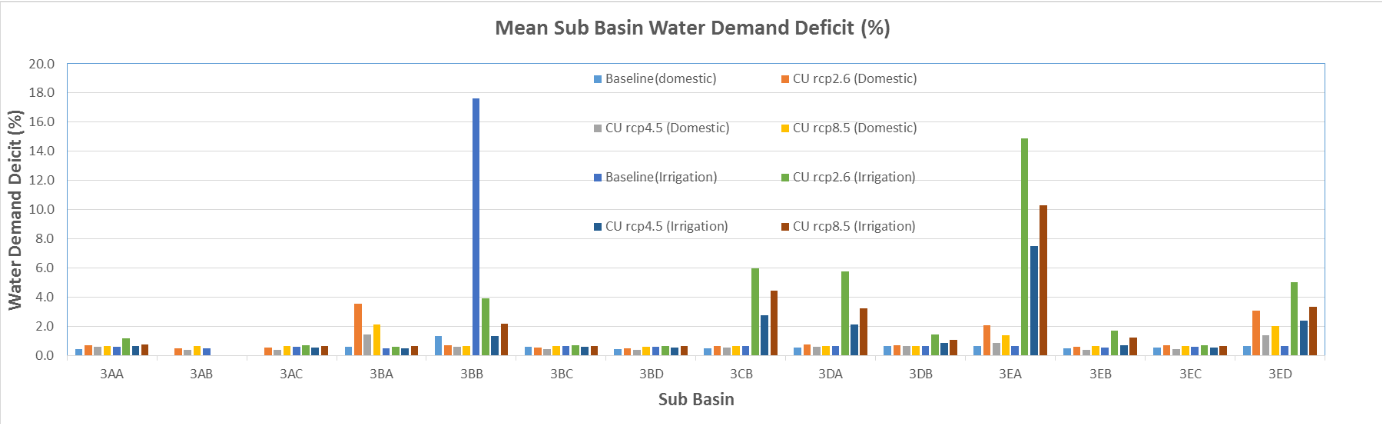

Figure 11: Mean Sub Basin Water Demand Deficit for Baseline and Current Period under various Climate Scenarios

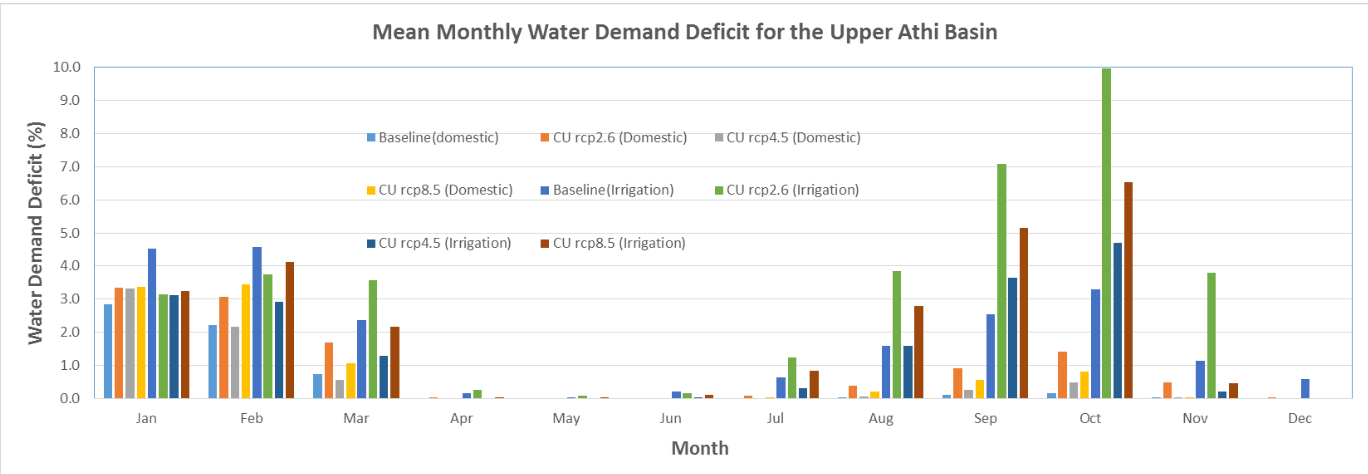

Figure 12: Mean Monthly Water Demand Deficit for Baseline and Current Period under various Climate Scenarios

3.4 Irrigation Water Demand Increase Associated with projected Climate in the Upper Athi Basin

Major Irrigation water requirement occurs in the drier season of January -March, the baseline and three future RCPs were considered in the water resources simulation carried and reported in the previous sections. Irrigation acreage forecast figures were available only for near future period of 2011-2040 and the figures provided are for that period.

Figure 13 shows the season potential evapotranspiration (PET) for the baseline (1981-2010) and for the 2011-2040 for the three emission pathway projections. This is the average over the 30-year period.

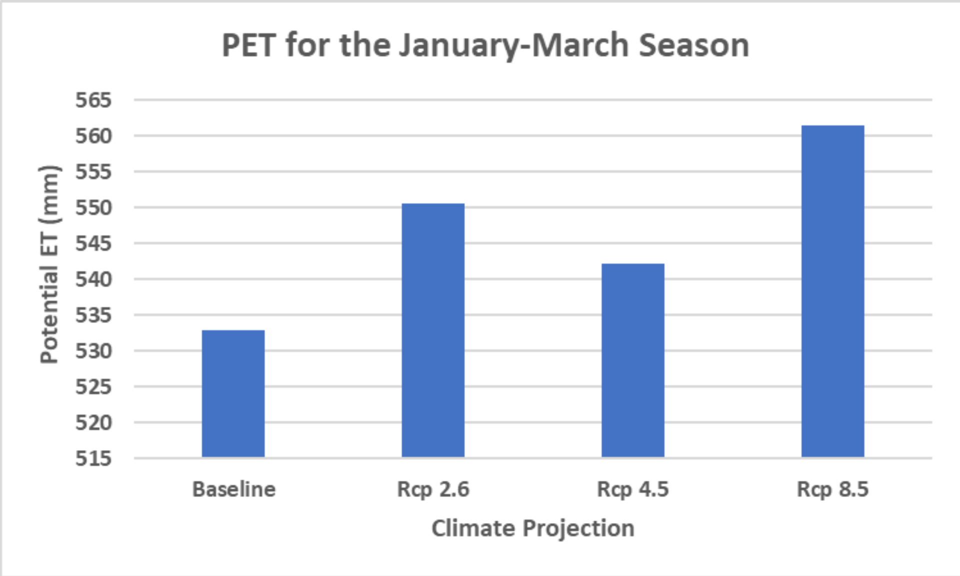

Figure 13: Mean Seasonal PET for January-March Period

Table one indicates the calculated net irrigation water requirement based on current and projected PET and irrigation area. In both cases the increase in irrigation demand is due to projected increase in PET. The mean increase for the January-March season is between 0.38 to 2.0 million cubic meters (MCM)

Table 6: Irrigation Water Requirement and Increase for the Upper Athi

	Irrigation Water Requirement (MCM)	Increase compared with baseline (MCM)	Irrigation Water Requirement (MCM)	Increase compared with baseline (MCM)
Climate Scenario	**Using baseline Acreage**		**Using Forecasted Acreage**	
Baseline	21.52		37.16	
Rcp 2.6	22.24	0.72	38.40	1.24
Rcp 4.5	21.90	0.38	37.81	0.65
Rcp 8.5	22.68	1.16	39.16	2.00

4. INFRASTRUCTURE LEVEL WATER BALANCE ANALYSIS

4.1 Methodology

Water supply and demand analysis was carried for the pan based systems. In total there are 22 water pans earmarked for rehabilitation. Nyandarua County has 11, Kiambu 2 and Machakos 9. The water balance components considered in this analysis are pan inflows, pan evaporation and withdrawals associated with the demand. A simple spreadsheet model is used to carry out the infrastructure water balance.

Pan Inflows: This are estimated using the precipitation falling in the pan delineated catchment area and a runoff coefficient. The runoff co-efficient established from the sub catchment where the pan is located is used as there are no observed inflows data. The sub catchment runoff coefficient is calculated based on longterm analysis of the runoff and precipitation of the sub catchment. The runoff coefficient used range from 0.18 to 0.30.

Pan Evaporation: The loss from the pan due to evaporation is estimated using the pan surface area and Climate model evaporation data. Due to the difficulty in modelling the changes in the surface area a constant area derived from satellite imagery is used.

Water withdrawals: The withdrawals from the pan is based on the demand, this is estimated using the number of beneficiaries household reported and assuming a household of six persons and a per capita water use/demand of 50lts as per the rural water supply manual. Population change was not included in this assessment.

Two indicators were used in assessing the pan water balance results, i) the month volume in the pan and ii) the number of months (out of the 360 simulation months) that the pan dries out. Furhter to test the impact of improving the capacity of the pan, each pan's capacity was increased by 25% and the water balance simulation done again.

4.2 Results

The results for two representative water pans systems one small in Nyandarua and the other large in Machakos county are explained further. Kwa Katheka pan with a capacity of 96,560m^3 is located in Machakos County and Mbiru pan with a capacity of 4,115m^3 is located in Nyandarua County.

From the results the mean monthly stored volume, comparing the baseline and the other future scenarios, there not significant change during the rainy season but there was a decrease in the stored volume in future scenarios in the dry months of June to September. (Figures 14-15)

Regarding the number of months the pan dries up, the results (Table 7) shows that the number of months tend to increase in future scenario compared with the baseline. Larger pans are less susceptible to drying up than smaller ones.

However by increasing the capacity of this pans, the number of months the pan dries up is reduced and this will further help take advantage of increased precipitation and withstand enhanced evaporation.

The main source of uncertainty in this study is the errors that are associated with input data as it is difficult to get calibration//validation data for this level of study.

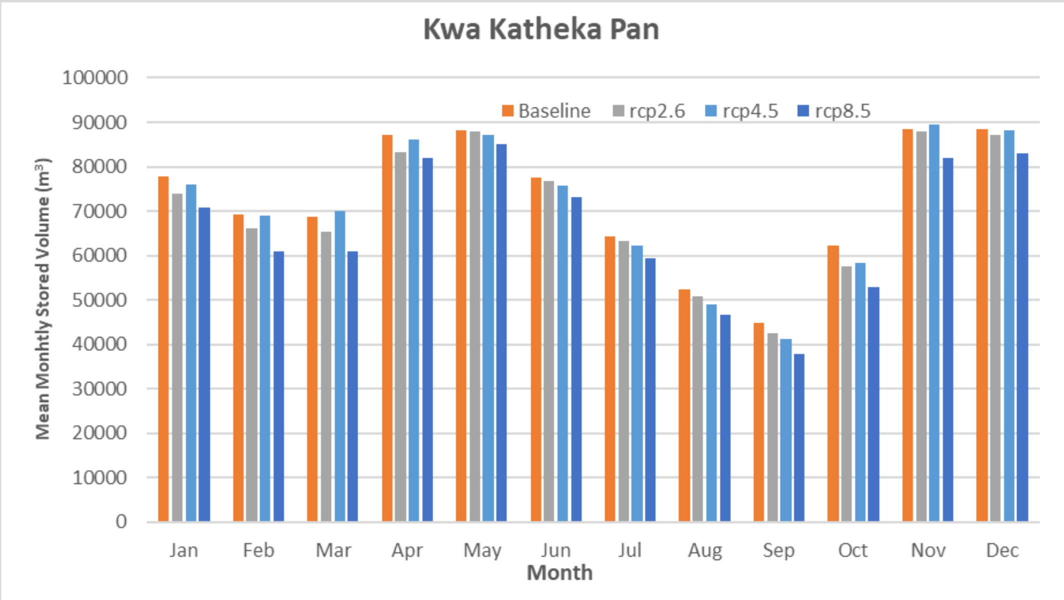

Figure 14 Mean monthly Stored Volume for Kwa Katheka Pan (Machakos County)

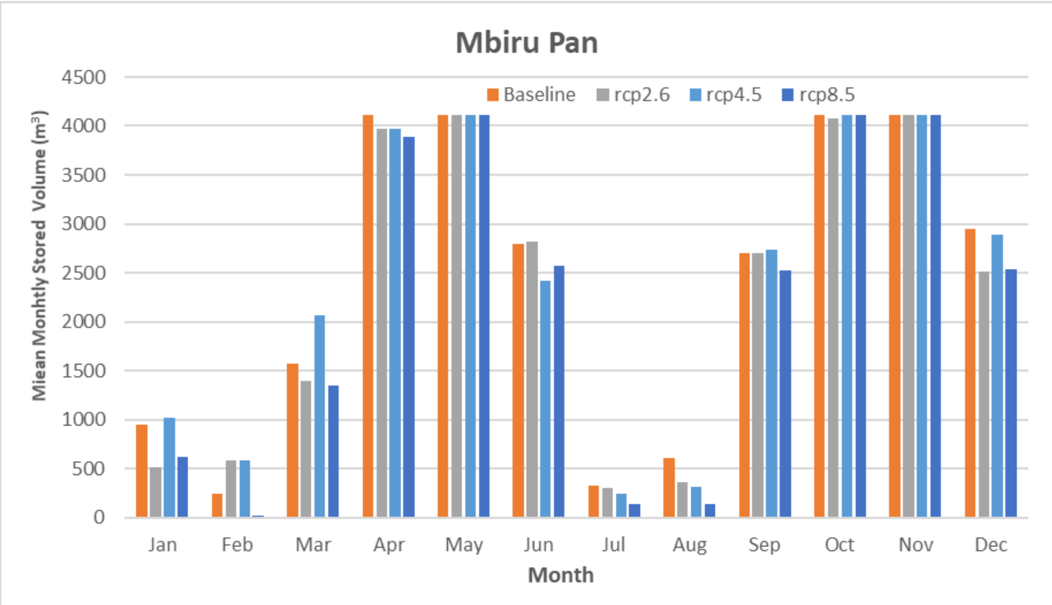

Figure 15 Mean monthly Stored Volume for Mbiru Pan (Nyandarua County)

Table 7: Simulation results on number of Months Pans dries out

Pan	**County**	**Capacity (M^3)**	**No of Households Served**	**No of Months the Pan dries out**			
				Baseline	rcp2.6	rcp4.5	rcp8.5
Mbiru		4,114	500	104	116	112	132
Mbiru	Nyandarua	5,142	500	87	97	97	111
Kwa Katheka		96,560	1500	5	4	7	7
Kwa Katheka	Machakos	120,700	1500	5	2	7	5

5. CONLUSION AND RECOMMENDATIONS

4.1 Conclusion

- A rainfall-runoff and water resources models was set up and calibrated against naturalized observed discharge for the upper Athi river basin. These models were used to assess the impact of future climate on water resources and use in the basin.
- Rainfall-runoff and water resources modelling were undertaken for the upper Athi river basin at the sub basin scale for the baseline period of 1981-2010 and three future 30years periods up to 2100 for the three emission pathways of rcp2.6, 4.5 and 8.5 creating a set of 9 simulations for each case.
- The results on natural streamflow (rainfall-runoff) simulation indicate that 8 out 9 simulations indicate increased flows in the upper Athi river basin in future. One scenario (rcp2.6 for the period 2011-2040) indicates that the flows will be below the baseline period.
- Seasonal flow pattern indicate an increase of flows in the generally drier months of December to March.
- Water demand deficit are likely to increase in future due to increased demand for which the increase in streamflow is unlikely to satisfy.
- January-March and July-October are the months that the upper Athi will experience water shortage when comparing the supply and demands. Irrigation sector will be the worst affected.
- Infrastructure level water balance analysis indicate that the number of months the pans dries out tend to increase in future scenario compared with the baseline. Larger pans are less susceptible to drying up than smaller ones.
- The mean monthly stored volume in the pans, shows a decrease in the future scenarios in the dry months of June to September.

4.2 Recommendations

This predicted changed in water resources availability situations indicated in this report are important for water resources management and policy maker for long term planning. The suggested action to mitigate the water shortage are;

- Improvement of the landscape by planting vegetation/trees in order to reduce bare land and retain as much rainfall in the soil. This will deter future deterioration of the water quality and reduce incidence of flash floods. It will also reduce sediment transport that check the increase of operation and maintenance cost of water storage and treatment works
- Develop new water storage facilities and rehabilitate old one to improve the storage capacities. The storage works particularly small community managed ones that are located away from the main streams can help mitigate the water shortage periods as the infrastructure level water balance analysis has shown.

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APPENDIX

ANNEX A: Sub Basin Mean Monthly Natural Streamflow (m^3/s)

Baseline	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Jan	6.4	11.1	18.7	10.4	1.5	6.8	3.8	2.1	21.7	24.4	3.9	8.2	4.1	24.4
Feb	4.2	8.0	12.5	7.1	1.0	5.0	2.7	1.4	13.9	15.8	2.1	4.1	2.8	15.8
Mar	6.2	12.4	17.8	10.0	1.2	7.0	3.9	1.8	20.7	23.3	3.6	9.2	4.5	23.3
Apr	14.5	27.7	45.3	26.7	3.5	20.8	11.5	6.2	56.7	62.0	10.0	24.1	10.0	62.0
May	15.6	22.3	45.2	29.9	4.7	23.5	12.5	7.9	52.5	55.5	6.2	11.9	5.3	55.5
Jun	7.6	10.5	23.0	15.5	2.9	12.5	6.5	4.5	25.4	27.1	2.2	3.4	2.9	27.1
Jul	4.4	6.5	13.3	8.7	1.5	7.1	3.7	2.3	14.4	15.7	1.0	1.6	2.1	15.7
Aug	3.0	4.6	9.1	5.8	1.0	4.8	2.5	1.5	9.7	10.7	0.6	1.0	1.5	10.7
Sep	2.3	3.6	7.0	4.4	0.7	3.6	1.9	1.1	7.4	8.2	0.5	0.8	1.2	8.2
Oct	2.0	3.1	6.3	4.0	0.7	4.3	2.2	1.1	6.8	7.4	0.4	1.0	1.0	7.4
Nov	5.8	10.4	23.5	11.9	1.4	10.6	5.9	2.8	31.7	38.9	7.2	22.9	9.0	38.9
Dec	7.4	14.0	25.5	13.4	1.8	9.4	5.2	3.1	32.3	37.9	7.4	18.6	7.4	37.9
Mean	6.6	11.2	20.6	12.3	1.8	9.6	5.2	3.0	24.4	27.2	3.8	8.9	4.3	27.2

rcp2.6_current	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Jan	6.0	10.7	19.1	10.6	1.5	7.2	4.0	2.3	22.4	25.6	3.9	8.5	4.2	25.6
Feb	4.1	8.0	12.6	7.2	1.0	5.1	2.8	1.4	14.1	16.1	1.9	4.0	2.8	16.1
Mar	4.2	8.7	12.6	7.1	0.9	5.1	2.8	1.4	14.2	16.2	2.2	5.1	2.9	16.2
Apr	9.6	19.2	29.7	17.2	2.1	13.1	7.2	3.6	36.3	40.0	6.4	15.7	6.6	40.0
May	13.0	19.5	39.7	25.3	3.7	20.7	11.1	6.5	46.9	49.9	5.9	12.9	5.6	49.9
Jun	8.5	10.4	25.7	17.6	3.1	14.7	7.6	4.9	28.3	30.0	2.3	4.0	2.7	30.0
Jul	4.2	5.9	13.2	8.8	1.5	7.4	3.8	2.4	14.3	15.5	1.0	1.6	1.8	15.5
Aug	2.8	4.0	8.7	5.6	0.9	4.7	2.5	1.4	9.3	10.2	0.6	1.0	1.4	10.2
Sep	2.1	3.1	6.5	0.4	0.7	3.5	1.8	1.1	6.9	7.6	0.4	0.7	1.0	7.6
Oct	1.7	2.6	5.4	3.4	0.6	3.3	1.7	0.9	5.8	6.3	0.4	0.6	0.8	6.3
Nov	4.4	8.0	17.7	9.1	1.0	8.5	4.7	2.1	23.7	29.0	5.1	16.3	6.4	29.0
Dec	8.1	15.5	30.9	15.7	2.2	11.2	6.5	3.9	40.9	48.7	9.8	24.7	9.4	48.7
Mean	5.7	9.6	18.5	10.7	1.6	8.7	4.7	2.7	21.9	24.6	3.3	7.9	3.8	24.6

rcp2.6_NF	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Jan	9.9	17.7	28.5	16.1	2.1	8.8	5.1	2.9	33.3	37.2	5.5	11.8	5.1	37.2
Feb	6.8	12.4	19.0	10.9	1.4	6.6	3.7	1.9	21.1	23.6	3.0	6.1	3.4	23.6
Mar	6.9	14.1	19.3	10.9	1.3	6.8	3.8	1.9	21.7	24.4	3.4	7.5	3.8	24.4
Apr	13.8	29.4	40.4	23.5	2.9	15.6	8.8	4.4	48.5	53.1	8.3	19.7	8.3	53.1
May	15.2	25.1	45.3	28.8	4.2	22.3	12.0	7.0	52.7	56.1	6.6	13.8	6.2	56.1
Jun	9.6	12.8	28.1	19.1	3.2	15.5	8.0	5.1	30.7	32.5	2.4	4.0	3.0	32.5
Jul	5.0	7.7	15.2	9.9	1.7	7.9	4.1	2.5	16.3	17.6	1.1	1.8	2.1	17.6
Aug	3.4	5.5	10.3	6.6	1.1	5.1	2.7	1.6	11.0	12.0	0.7	1.1	1.6	12.0
Sep	2.6	4.3	7.9	5.0	0.8	3.8	2.0	1.2	8.4	9.1	0.5	0.8	1.2	9.1
Oct	2.2	3.6	6.7	4.2	0.7	3.7	1.9	1.1	7.1	7.7	0.4	0.8	1.0	7.7
Nov	5.0	9.5	19.5	10.2	1.1	8.7	4.9	2.3	25.6	31.0	5.1	16.0	6.1	31.0
Dec	10.2	20.4	37.0	19.0	2.5	11.8	7.0	4.2	48.2	56.9	10.9	26.8	9.7	56.9
Mean	7.5	13.5	23.1	13.7	1.9	9.7	5.3	3.0	27.0	30.1	4.0	9.2	4.3	30.1

rcp2.6_FF	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Jan	10.0	17.3	28.7	16.0	2.1	9.7	5.5	3.1	33.7	38.0	5.9	13.0	5.6	38.0
Feb	6.8	12.3	19.0	10.8	1.5	6.9	3.8	2.0	21.1	23.7	3.2	6.8	3.9	23.7
Mar	6.3	12.4	18.1	10.1	1.3	6.8	3.7	1.8	20.7	23.7	3.6	8.5	4.4	23.7
Apr	12.8	25.4	39.0	22.2	2.8	16.3	9.0	4.5	48.2	53.9	9.2	21.8	9.3	53.9
May	13.5	21.2	41.5	25.9	4.0	21.3	11.4	6.8	49.3	53.0	6.7	13.8	6.2	53.0
Jun	8.1	10.8	24.9	16.6	2.8	14.2	7.3	4.5	27.5	29.5	2.4	4.0	3.1	29.5
Jul	4.4	6.6	13.8	8.9	1.5	7.4	3.8	2.3	15.0	16.5	1.1	1.8	2.2	16.5
Aug	3.0	4.7	9.5	5.9	1.0	4.9	2.5	1.5	10.1	11.3	0.7	1.1	1.6	11.3
Sep	2.3	3.7	7.3	4.5	0.7	3.6	1.9	1.1	7.8	8.6	0.5	0.9	1.3	8.6
Oct	2.0	3.2	6.2	3.8	0.6	3.6	1.9	1.0	6.7	7.4	0.5	0.8	1.0	7.4
Nov	4.4	7.8	17.5	9.0	1.0	8.3	4.5	2.1	23.2	28.5	4.7	15.3	6.1	28.5
Dec	9.2	17.4	34.0	17.3	2.3	11.8	6.8	3.9	44.6	53.4	10.4	26.2	9.7	53.4
Mean	6.9	11.9	21.6	12.6	1.8	9.6	5.2	2.9	25.7	29.0	4.1	9.5	4.5	29.0

rcp4.5_Current	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Jan	7.2	12.4	20.8	11.8	1.7	7.8	4.2	2.4	23.7	26.6	3.7	7.8	4.2	26.6
Feb	5.5	10.6	16.0	9.1	1.2	6.2	3.4	1.7	17.8	20.0	2.8	6.0	3.6	20.0
Mar	8.5	18.1	24.5	13.5	1.6	8.5	4.9	2.3	28.7	32.3	5.2	12.3	5.5	32.3
Apr	16.7	33.6	51.4	30.2	4.0	21.7	12.4	6.8	63.1	68.4	10.7	24.7	10.2	68.4
May	15.6	22.6	45.4	29.9	4.8	23.0	12.3	7.7	51.8	54.7	5.6	10.4	5.0	54.7
Jun	7.6	11.2	23.2	15.4	2.8	12.1	6.3	4.3	25.3	27.1	2.0	3.2	2.9	27.1
Jul	4.6	7.2	14.0	9.0	1.5	7.0	3.7	2.2	15.0	16.3	1.0	1.6	2.1	16.3
Aug	3.2	5.2	9.7	6.1	1.0	4.7	2.5	1.5	10.3	11.3	0.7	1.1	1.6	11.3
Sep	2.5	4.1	7.6	4.7	0.8	3.6	1.9	1.2	8.1	8.8	0.5	0.8	1.2	8.8
Oct	2.1	3.6	6.8	4.2	0.7	4.0	2.1	1.1	7.3	7.9	0.5	1.1	1.1	7.9
Nov	8.0	16.2	31.1	15.7	1.8	12.3	6.9	3.4	41.5	51.3	9.7	29.6	11.9	51.3
Dec	9.2	17.1	30.7	16.5	2.3	10.7	6.0	3.7	37.9	43.9	7.8	18.2	7.0	43.9
Mean	7.6	13.5	23.4	13.9	2.0	10.1	5.6	3.2	27.5	30.7	4.2	9.7	4.7	30.7

rcp4.5_NF	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Jan	9.6	17.2	26.5	15.5	2.2	8.8	4.8	2.8	29.8	33.1	4.1	8.5	4.5	33.1
Feb	6.6	12.6	18.7	11.0	1.5	6.9	3.7	1.9	20.4	22.7	2.5	5.1	3.4	22.7
Mar	10.6	20.5	29.5	16.6	1.9	10.0	5.8	2.8	34.7	39.1	6.1	14.2	6.2	39.1
Apr	21.1	41.2	63.2	37.4	5.0	24.6	13.9	7.7	77.1	83.9	12.8	29.3	11.8	83.9
May	21.5	32.4	60.9	39.7	6.2	26.2	14.3	9.0	70.3	74.6	8.4	16.4	7.2	74.6
Jun	10.7	15.8	31.5	21.0	3.8	14.3	7.6	5.2	34.6	36.9	2.9	4.7	3.6	36.9
Jul	6.3	9.9	18.8	12.2	2.1	8.5	4.6	2.7	20.2	22.0	1.4	2.2	2.6	22.0
Aug	4.4	7.0	12.9	8.2	1.4	5.7	3.1	1.8	13.8	15.1	0.9	1.4	1.9	15.1
Sep	3.3	5.5	10.0	6.3	1.1	4.3	2.3	1.4	10.6	11.6	0.6	1.0	1.5	11.6
Oct	3.0	4.9	9.2	5.8	0.9	5.1	2.7	1.4	9.9	10.8	0.6	1.4	1.4	10.8
Nov	9.9	18.7	37.4	19.4	2.2	14.0	8.0	3.9	49.4	59.6	10.4	30.1	11.4	59.6
Dec	11.4	22.1	36.8	20.2	2.8	11.8	6.7	4.2	45.0	51.5	8.7	19.9	7.5	51.5
Mean	9.9	17.3	29.6	17.8	2.6	11.7	6.5	3.7	34.7	38.4	5.0	11.2	5.3	38.4

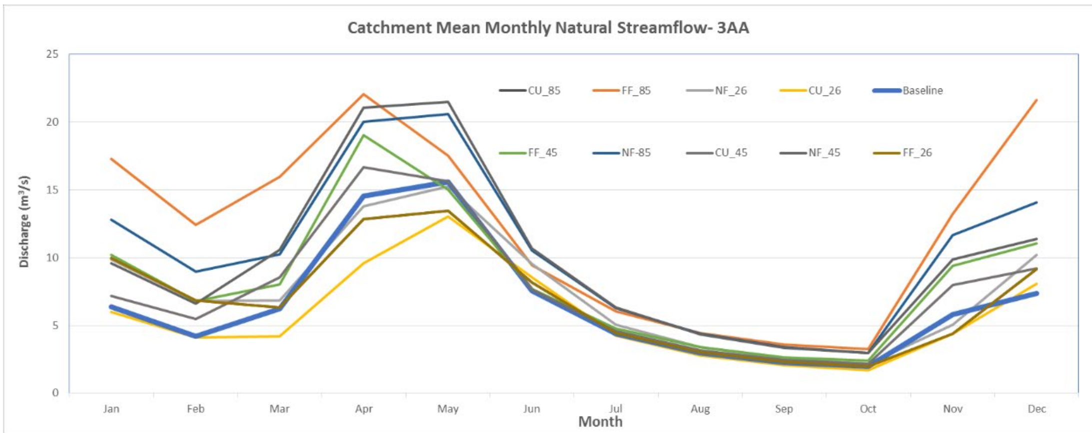
rcp4.5_FF	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Jan	10.2	17.0	27.7	16.0	2.2	9.1	5.1	3.0	31.3	34.9	4.5	9.2	4.5	34.9
Feb	6.8	12.0	18.9	11.1	1.5	6.9	3.8	2.0	20.7	23.2	2.5	4.8	3.1	23.2
Mar	8.0	15.3	22.1	12.7	1.5	7.9	4.5	2.1	24.8	27.7	3.4	8.2	4.2	27.7
Apr	19.0	36.8	57.2	34.1	4.3	23.3	13.2	7.1	69.3	75.3	10.6	24.7	10.1	75.3
May	15.0	23.5	44.6	29.0	4.8	21.5	11.6	7.6	51.2	54.4	5.7	10.6	5.0	54.4
Jun	7.7	11.9	23.5	15.4	2.8	11.6	6.2	4.1	25.8	27.7	2.1	3.3	2.8	27.7
Jul	4.8	7.8	14.6	9.3	1.6	7.1	3.8	2.2	15.7	17.1	1.1	1.7	2.1	17.1
Aug	3.4	5.6	10.3	6.5	1.1	4.8	2.6	1.5	11.0	12.1	0.7	1.1	1.5	12.1
Sep	2.7	4.5	8.2	5.1	0.9	3.7	2.0	1.2	8.7	9.5	0.5	0.9	1.2	9.5
Oct	2.4	4.0	7.6	4.8	0.8	4.6	2.4	1.3	8.2	8.9	0.5	1.1	1.1	8.9
Nov	9.4	18.6	36.4	18.4	2.0	13.2	7.7	3.9	49.4	61.0	11.4	32.3	12.0	61.0
Dec	11.0	20.0	36.3	19.5	2.7	11.8	7.0	4.3	45.2	52.0	9.1	20.3	7.2	52.0
Mean	8.4	14.8	25.6	15.2	2.2	10.5	5.8	3.3	30.1	33.7	4.3	9.8	4.6	33.7

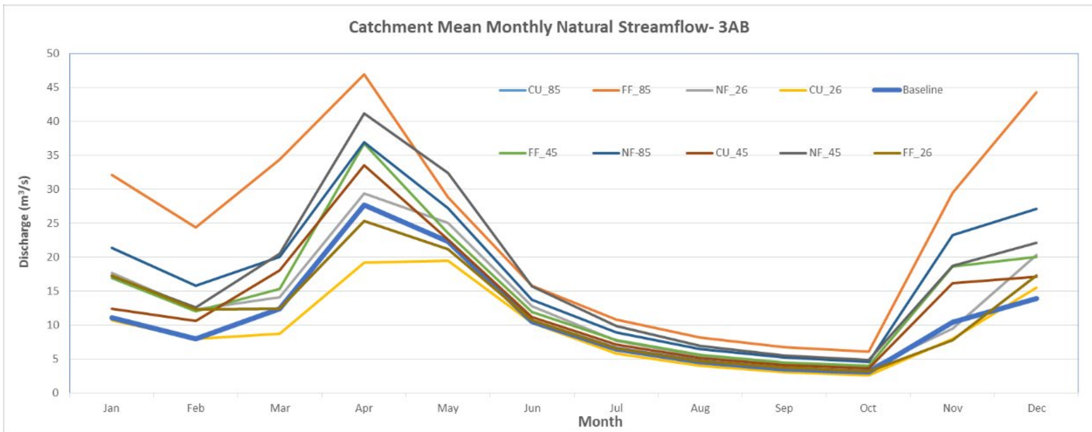
rcp8.5_Current	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Jan	5.8	11.1	17.5	9.8	1.4	6.0	3.4	2.0	20.0	22.5	3.1	6.2	3.5	22.5
Feb	3.6	7.1	11.2	6.4	0.9	4.1	2.3	1.3	12.3	14.1	1.5	2.8	2.4	14.1
Mar	6.4	13.2	18.5	10.3	1.2	6.3	3.7	1.7	21.8	24.6	3.7	9.4	4.3	24.6
Apr	15.0	30.3	46.5	27.4	3.6	18.5	10.5	5.7	57.2	62.5	9.7	23.4	9.7	62.5
May	16.5	23.5	47.5	31.5	4.9	22.6	12.3	7.6	54.7	57.8	6.1	12.1	5.4	57.8
Jun	7.8	11.0	23.5	15.8	3.0	11.7	6.2	4.3	25.8	27.6	2.1	3.3	2.8	27.6
Jul	4.6	6.9	13.8	9.0	1.5	6.7	3.6	2.2	14.9	16.2	1.0	1.6	2.0	16.2
Aug	3.1	4.9	9.4	6.0	1.0	4.4	2.4	1.4	10.1	11.0	0.6	1.0	1.5	11.0
Sep	2.3	3.8	7.2	4.6	0.8	3.3	1.8	1.1	7.7	8.4	0.5	0.8	1.1	8.4
Oct	2.0	3.3	6.4	4.0	0.7	3.8	2.0	1.0	6.9	7.5	0.4	0.9	1.0	7.5
Nov	7.2	14.9	28.8	14.4	1.6	11.4	6.5	3.2	38.8	47.1	8.8	26.2	9.8	47.1

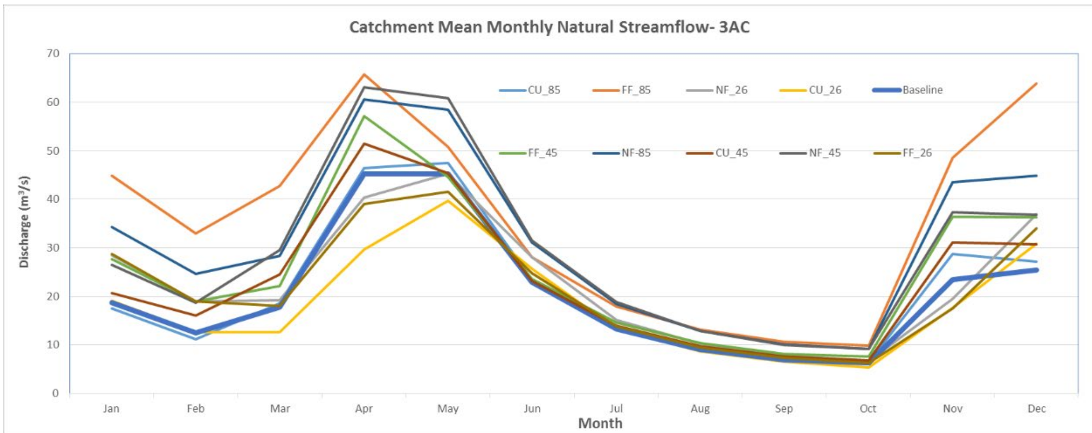
rcp8.5_Current	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Dec	7.9	16.6	27.2	14.5	2.1	9.2	5.3	3.3	33.7	38.7	7.1	16.9	6.7	38.7
Mean	6.9	12.2	21.5	12.8	1.9	9.0	5.0	2.9	25.3	28.2	3.7	8.7	4.2	28.2

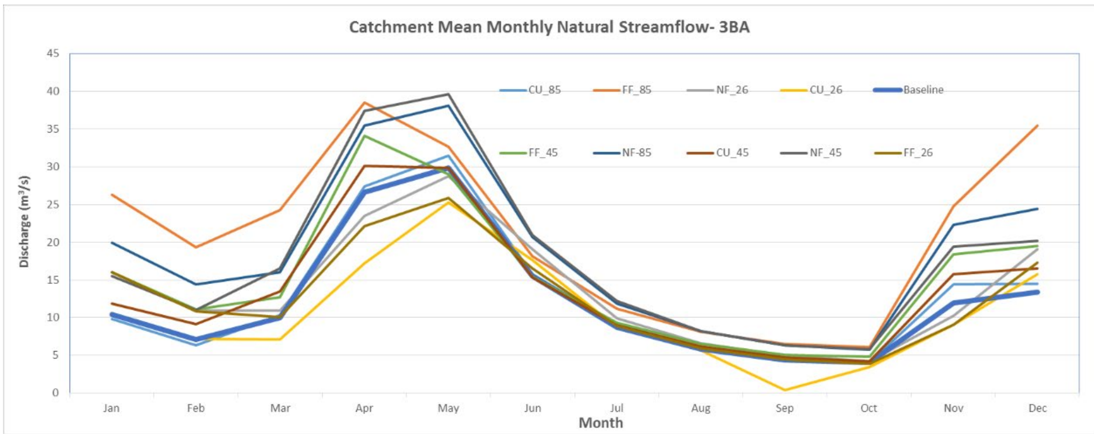
rcp8.5_NF	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Jan	12.8	21.4	34.3	19.9	2.7	11.0	6.2	3.6	38.8	43.1	5.6	11.4	5.3	43.1
Feb	9.0	15.8	24.6	14.4	2.0	8.4	4.7	2.5	27.0	29.9	3.4	6.5	3.7	29.9
Mar	10.2	20.0	28.4	16.0	2.0	9.0	5.2	2.6	32.5	36.6	5.1	11.9	5.6	36.6
Apr	20.0	37.0	60.6	35.5	4.6	23.0	13.3	7.1	74.7	81.6	12.1	26.8	10.5	81.6
May	20.6	27.3	58.4	38.1	5.9	25.9	14.4	9.0	67.2	71.2	7.1	12.9	5.5	71.2
Jun	10.5	13.8	31.1	20.7	3.7	13.9	7.6	5.2	34.0	36.4	2.6	4.0	3.1	36.4
Jul	6.3	8.9	18.5	11.9	2.0	8.0	4.4	2.8	19.9	21.6	1.3	2.0	2.3	21.6
Aug	4.4	6.5	12.9	8.2	1.3	5.4	3.0	1.8	13.8	15.1	0.8	1.3	1.7	15.1
Sep	3.4	5.2	10.1	6.3	1.1	4.1	2.3	1.5	10.7	11.8	0.6	1.0	1.3	11.8
Oct	3.0	4.6	9.1	5.7	0.9	4.6	2.5	1.4	9.8	10.6	0.6	1.2	1.1	10.6
Nov	11.7	23.3	43.5	22.3	2.5	15.3	9.0	4.7	58.0	70.6	12.5	34.9	12.9	70.6
Dec	14.1	27.1	44.9	24.4	3.4	14.0	8.1	5.2	55.2	63.7	10.8	24.1	8.6	63.7
Mean	10.5	17.6	31.4	18.6	2.7	11.9	6.7	4.0	36.8	41.0	5.2	11.5	5.1	41.0

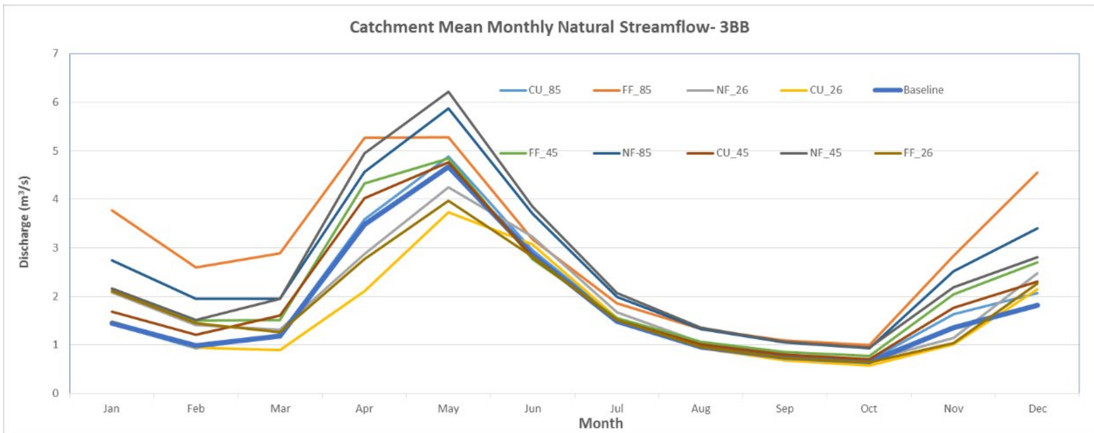
rcp8.5_FF	3AA	3AB	3AC	3BA	3BB	3BC	3BD	3CB	3DA	3DB	3EA	3EB	3EC	3ED
Jan	17.3	32.1	44.9	26.3	3.8	12.7	7.3	4.7	50.6	56.0	7.3	14.3	6.3	56.0
Feb	12.4	24.4	32.9	19.4	2.6	10.1	5.8	3.2	36.0	39.8	4.7	8.9	4.7	39.8
Mar	15.9	34.4	42.8	24.2	2.9	12.5	7.3	3.6	49.5	55.7	8.0	17.6	7.6	55.7
Apr	22.0	47.0	65.7	38.6	5.3	23.7	13.4	7.3	78.7	86.2	12.3	26.9	11.1	86.2
May	17.5	28.8	50.9	32.7	5.3	22.3	11.9	7.3	57.2	61.1	6.0	10.7	5.5	61.1
Jun	9.4	15.8	28.1	18.1	3.2	12.3	6.5	4.1	30.4	33.0	2.4	3.7	3.3	33.0
Jul	6.1	10.8	17.9	11.2	1.9	7.3	4.0	2.4	19.1	21.0	1.3	2.0	2.5	21.0
Aug	4.5	8.2	13.1	8.1	1.3	5.1	2.8	1.7	13.9	15.4	0.9	1.4	1.9	15.4
Sep	3.6	6.7	10.7	6.5	1.1	4.0	2.2	1.4	11.3	12.4	0.7	1.2	1.4	12.4
Oct	3.3	6.1	9.9	6.1	1.0	4.5	2.5	1.4	10.6	11.6	0.7	1.4	1.3	11.6
Nov	13.2	29.5	48.6	24.8	2.8	15.8	9.3	5.0	64.5	79.2	14.2	38.8	14.4	79.2
Dec	21.6	44.4	63.9	35.5	4.6	18.3	10.8	6.7	77.4	88.8	14.6	32.4	11.5	88.8
Mean	12.2	24.0	35.8	20.9	3.0	12.4	7.0	4.1	41.6	46.7	6.1	13.3	5.9	46.7

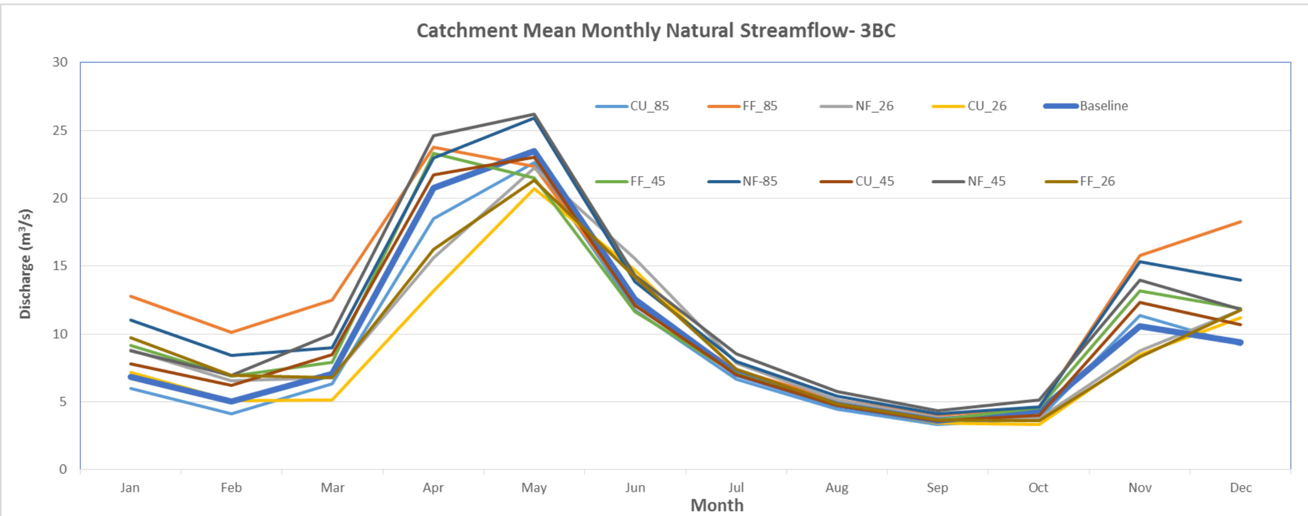

Catchment Mean Monthly Natural Streamflow- 3AA
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
Discharge (m³/s)
0
5
10
15
20
25
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

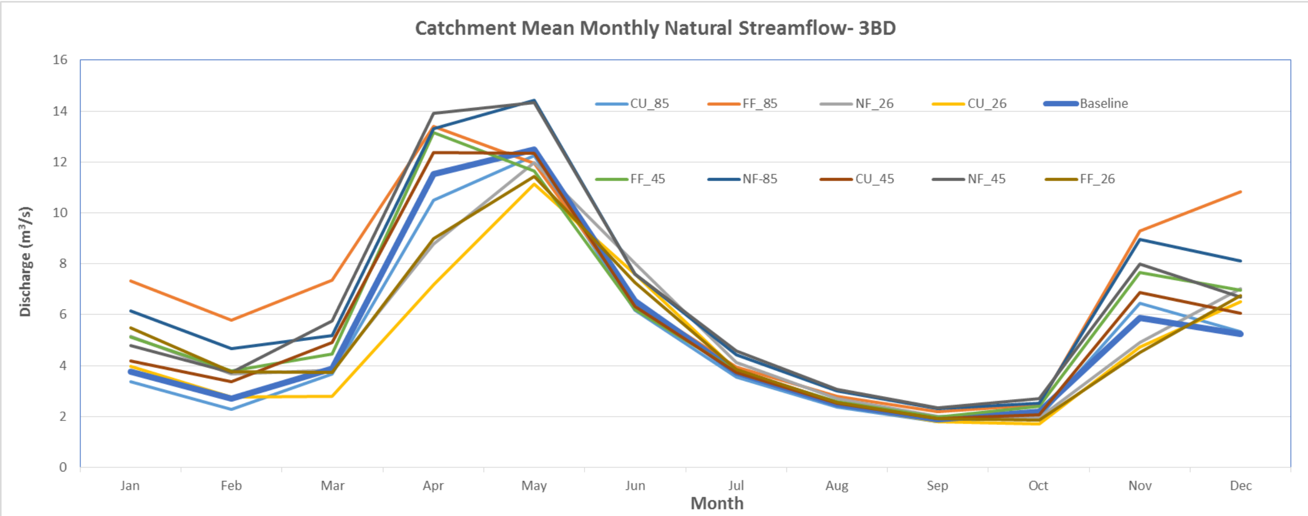

Catchment Mean Monthly Natural Streamflow- 3AB
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
Discharge (m³/s)
0
5
10
15
20
25
30
35
40
45
50
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

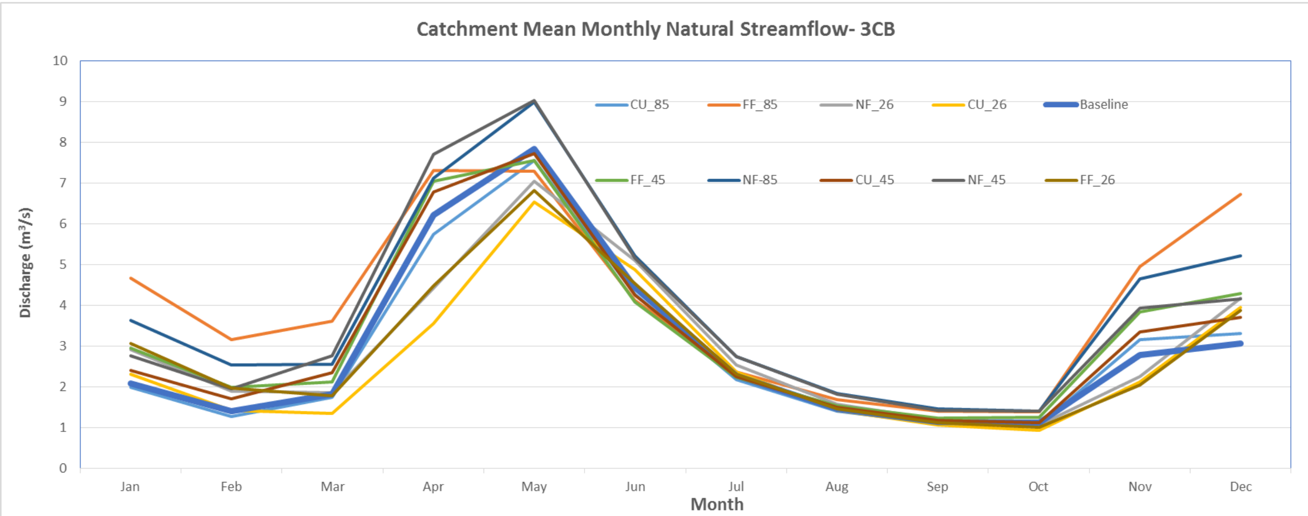

Catchment Mean Monthly Natural Streamflow- 3AC
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
Discharge (m³/s)
0
10
20
30
40
50
60
70
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month

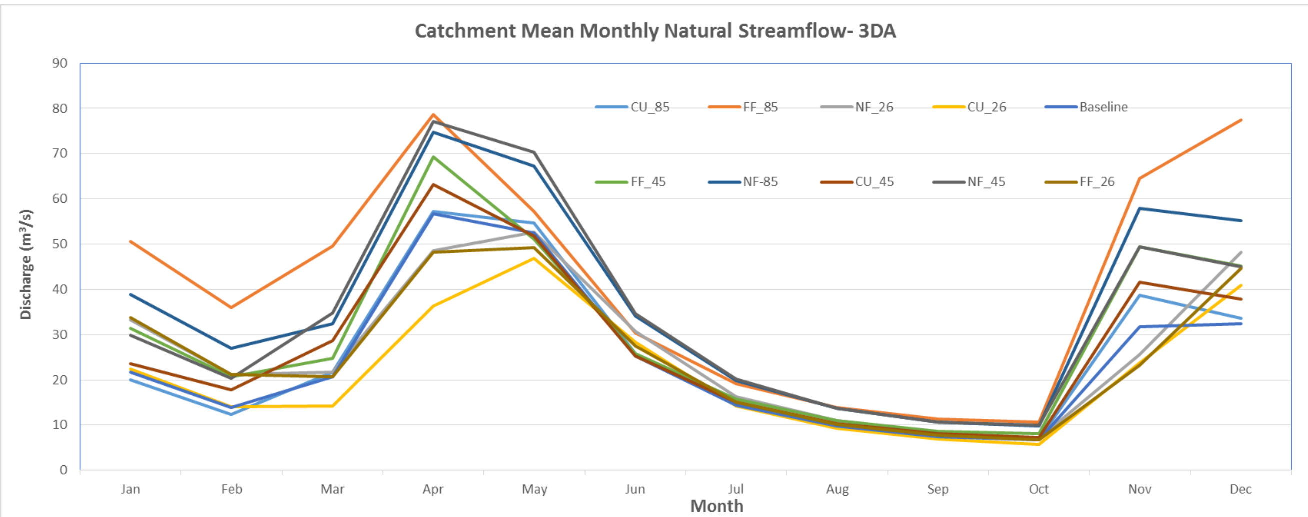

Catchment Mean Monthly Natural Streamflow- 3BA
Discharge (m³/s)
Month
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

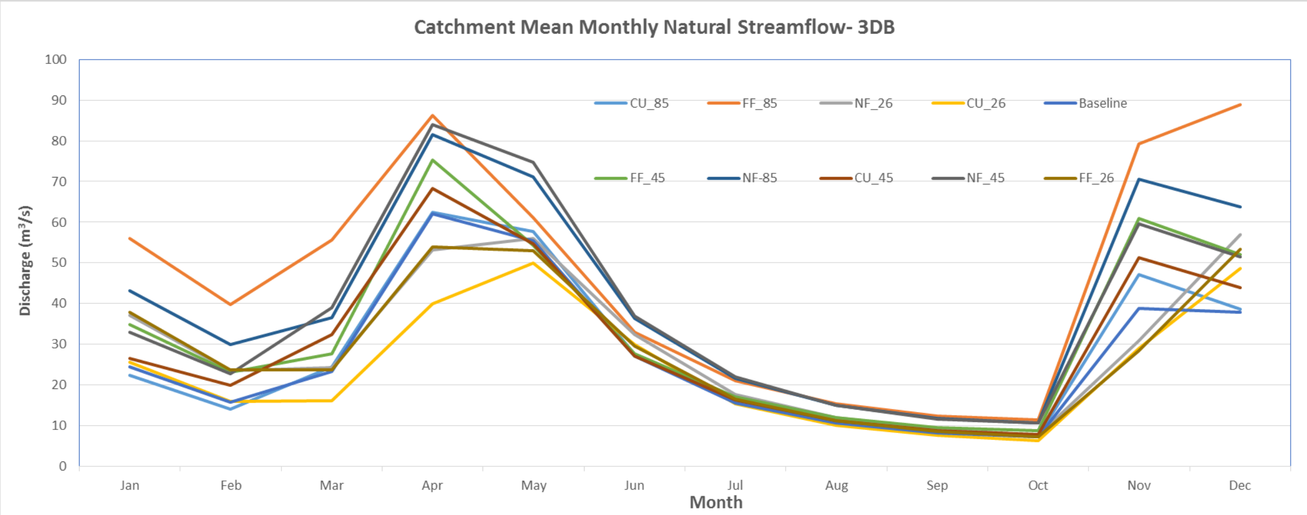

Catchment Mean Monthly Natural Streamflow- 3BB
Discharge (m³/s)
Month
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

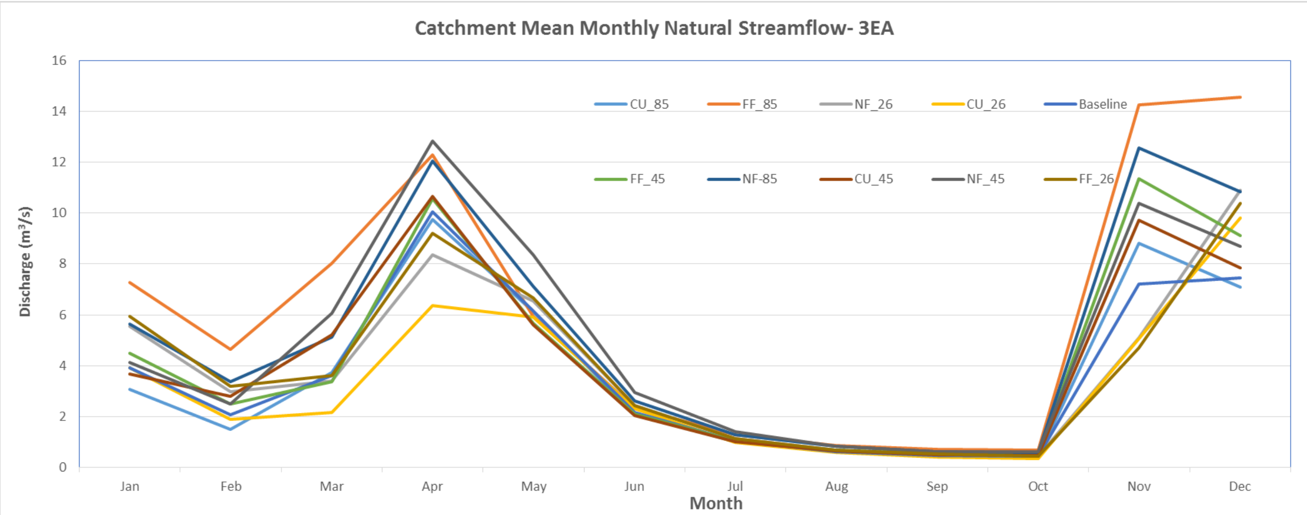

Catchment Mean Monthly Natural Streamflow- 3BC
Discharge (m³/s)
Month
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec

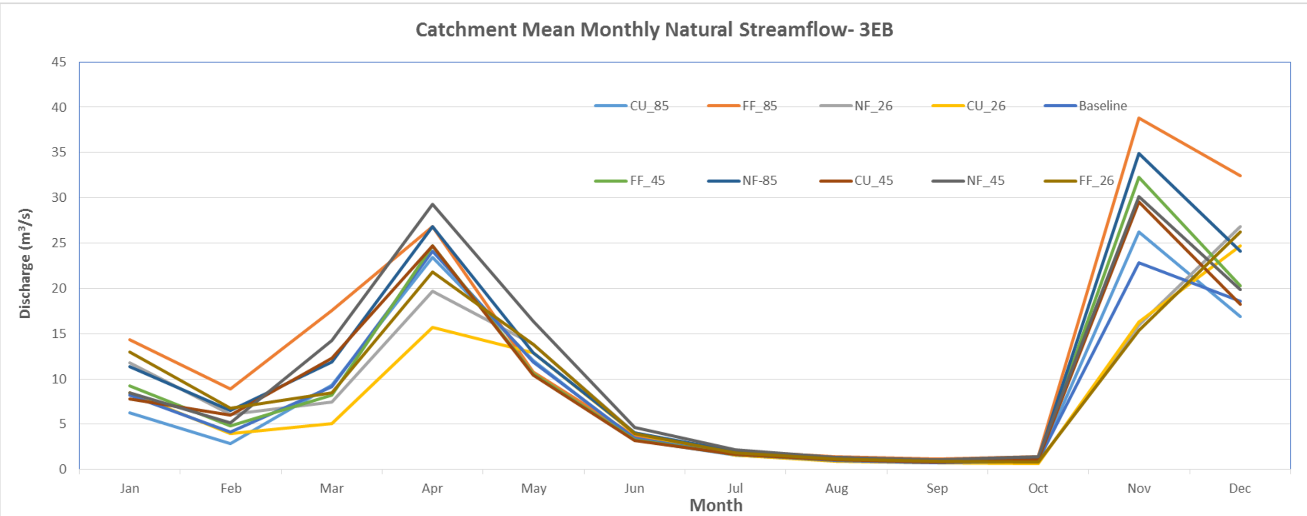

Catchment Mean Monthly Natural Streamflow- 3BD
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
Discharge (m³/s)
0
2
4
6
8
10
12
14
16
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Catchment Mean Monthly Natural Streamflow- 3CB
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
Discharge (m³/s)
0
1
2
3
4
5
6
7
8
9
10
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Catchment Mean Monthly Natural Streamflow- 3DA
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
Discharge (m³/s)
0
10
20
30
40
50
60
70
80
90
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month


Catchment Mean Monthly Natural Streamflow- 3DB
Discharge (m³/s)
Month
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
0
10
20
30
40
50
60
70
80
90
100
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


Catchment Mean Monthly Natural Streamflow- 3EA
Discharge (m³/s)
Month
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
0
2
4
6
8
10
12
14
16
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


Catchment Mean Monthly Natural Streamflow- 3EB
Discharge (m³/s)
Month
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
0
5
10
15
20
25
30
35
40
45
Jan
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Mar
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May
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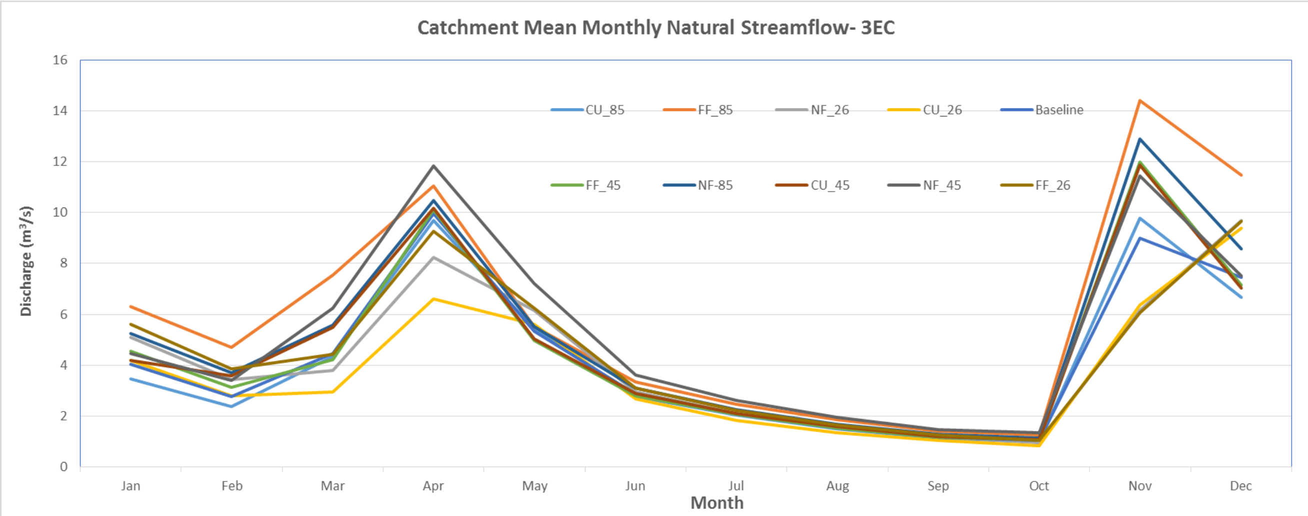
Jul
Aug
Sep
Oct
Nov
Dec


Catchment Mean Monthly Natural Streamflow- 3EC
Discharge (m³/s)
0
2
4
6
8
10
12
14
16
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
Jan
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Mar
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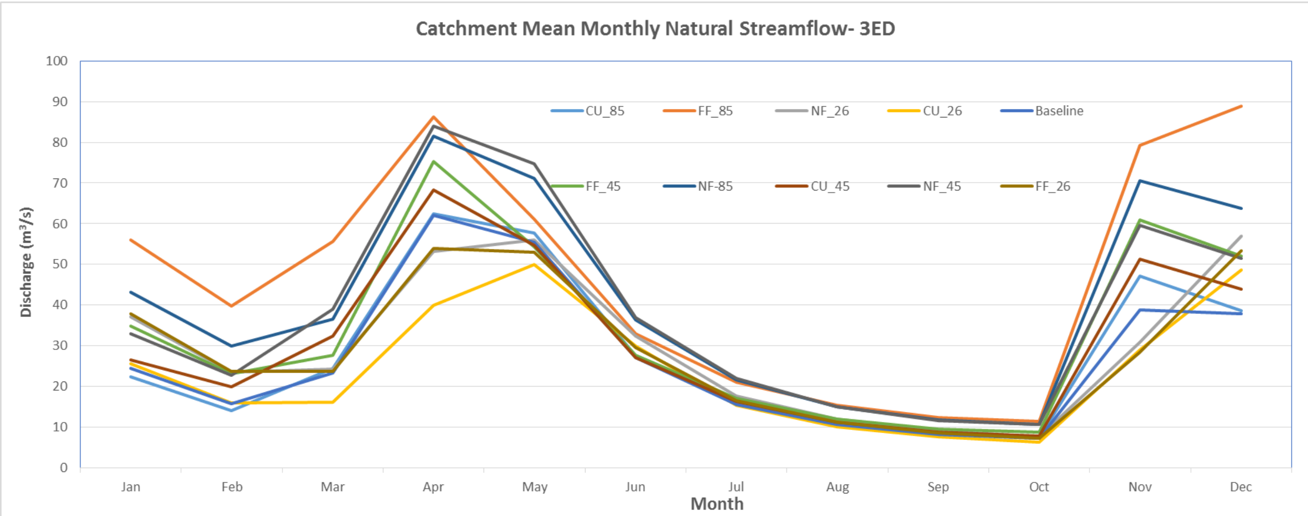
Sep
Oct
Nov
Dec
Month


Catchment Mean Monthly Natural Streamflow- 3ED
Discharge (m³/s)
0
10
20
30
40
50
60
70
80
90
100
CU_85
FF_85
NF_26
CU_26
Baseline
FF_45
NF-85
CU_45
NF_45
FF_26
Jan
Feb
Mar
Apr
May
Jun
Jul
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Nov
Dec
Month