

2nd Session

Case of Lake Muhazi

Muhazi 1

Facilitator: Nyirishema Richard



Hydrology of Lake Muhazi and new dyke

Alsaad Ndayizeye



OBJECTIVES

- Conduct a full Hydrological assessment of the Lake Muhazi sub-catchment, assess the water resources potential and availability for various uses.



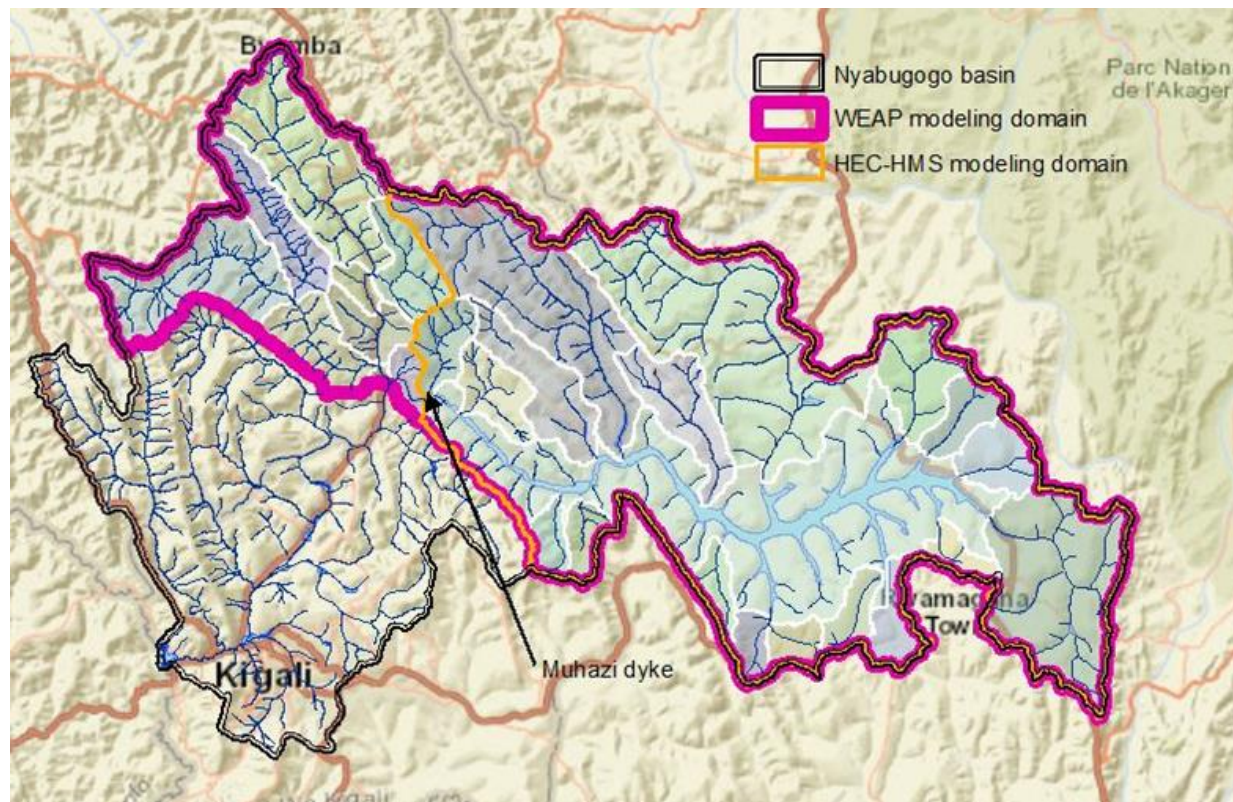
BACKGROUND

- Lake Muhazi is a central feature of the Nyabugogo catchment
- It has a length of about 37 km from East to West with a width between 0.6 – 2.0 km.
- Catchment area approximately 55% of the entire catchment (~900 km²)
- Situated at elevation 1,444 m.a.s.l.
- Occupies the floor of a system of valleys, with 13 narrow branches.
- The lake water level varies between seasons by a magnitude of circa 50 to 70 cm.

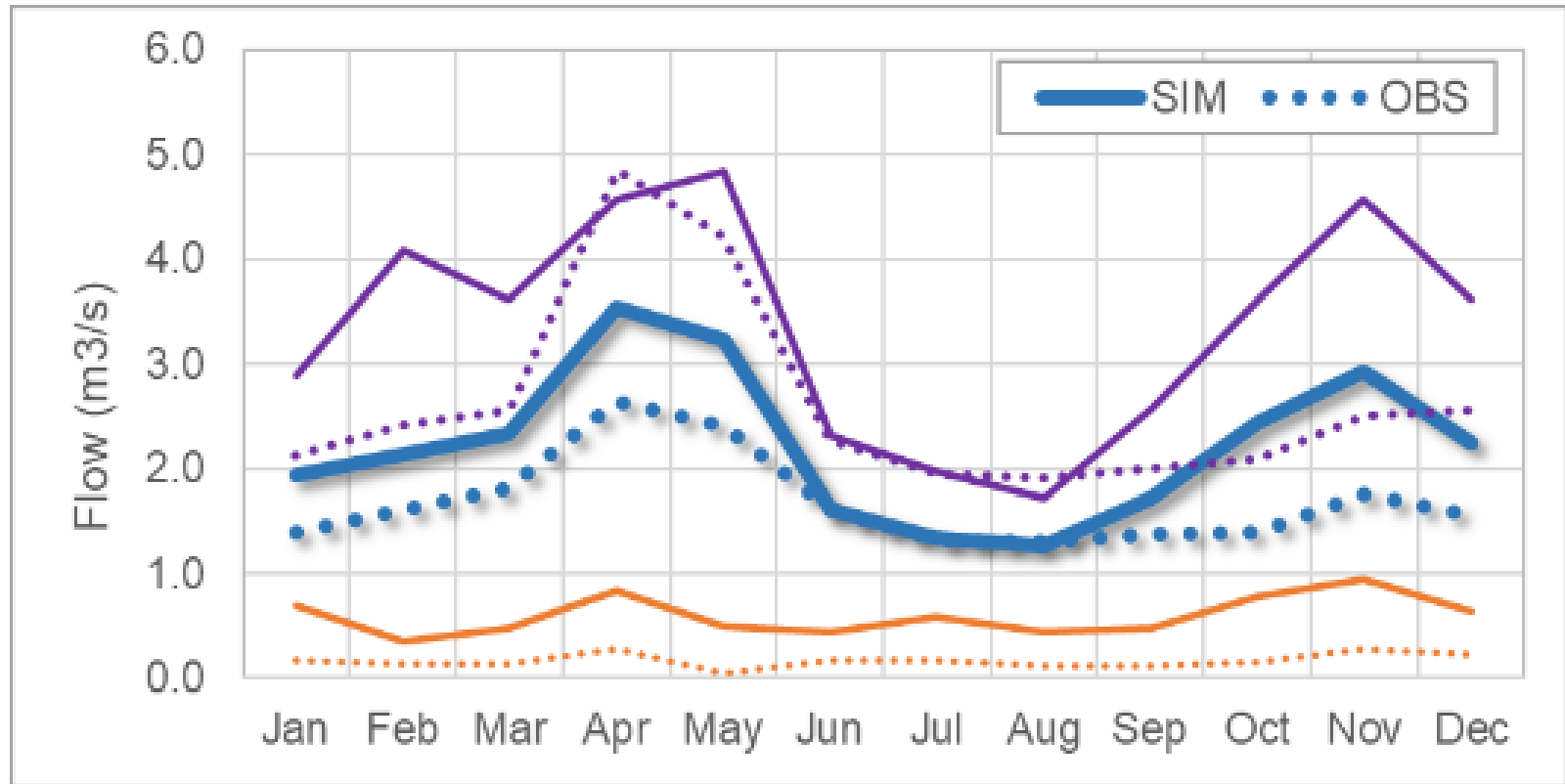


Water resources assessment

- Long-term water balance; future scenarios, climate change impacts, rule curves.



Validation with streamflow



Comparison of observed flow (OBS) with simulated flows (SIM) for Cyamutara. Average monthly values as well as minimum (orange) and maximum (purple) are depicted.

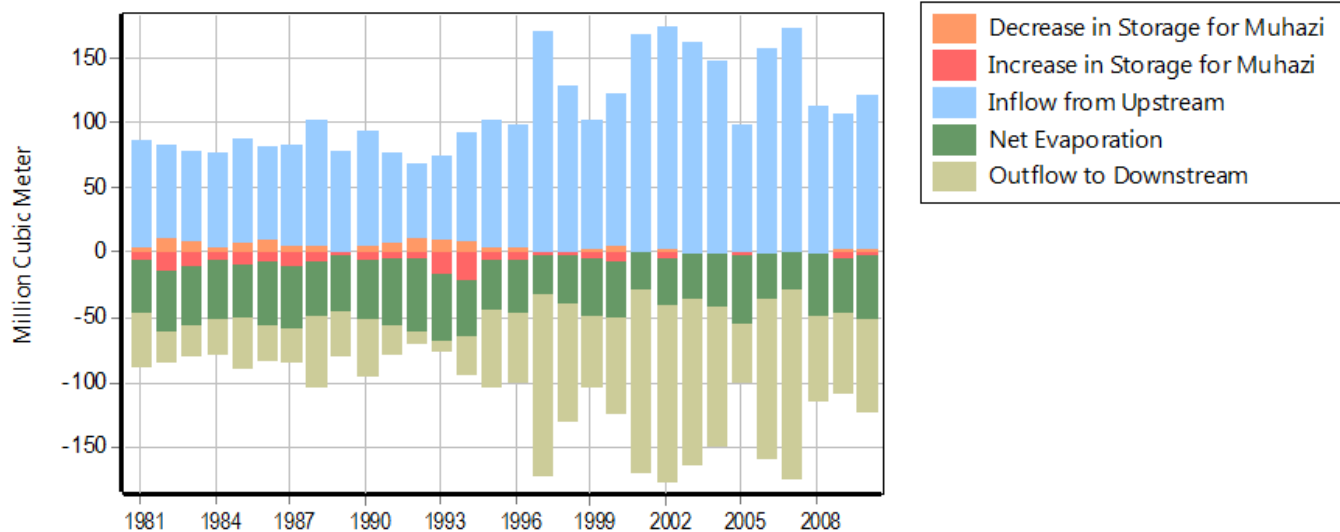


Water balance, annual and monthly

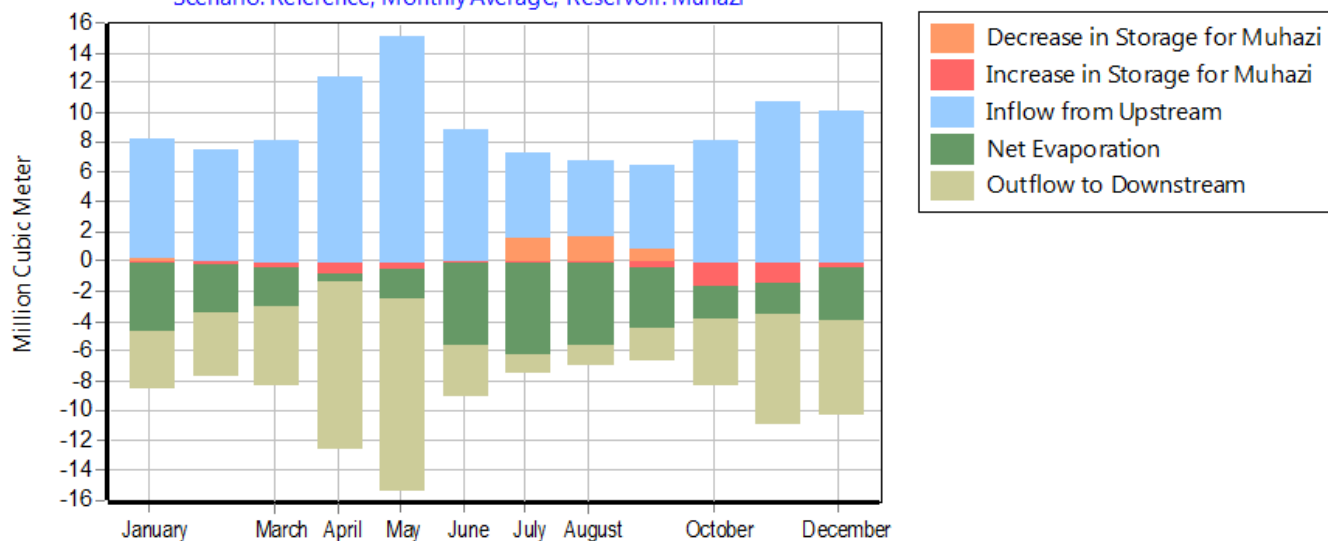
- Average monthly water balances of Lake Muhazi show the well-known seasonal patterns In June to August the inflow is very low and during those months level of the lake is going down.
- However, given the relatively big storage capacity of the lake there is no water shortage and all demand can be fulfilled.



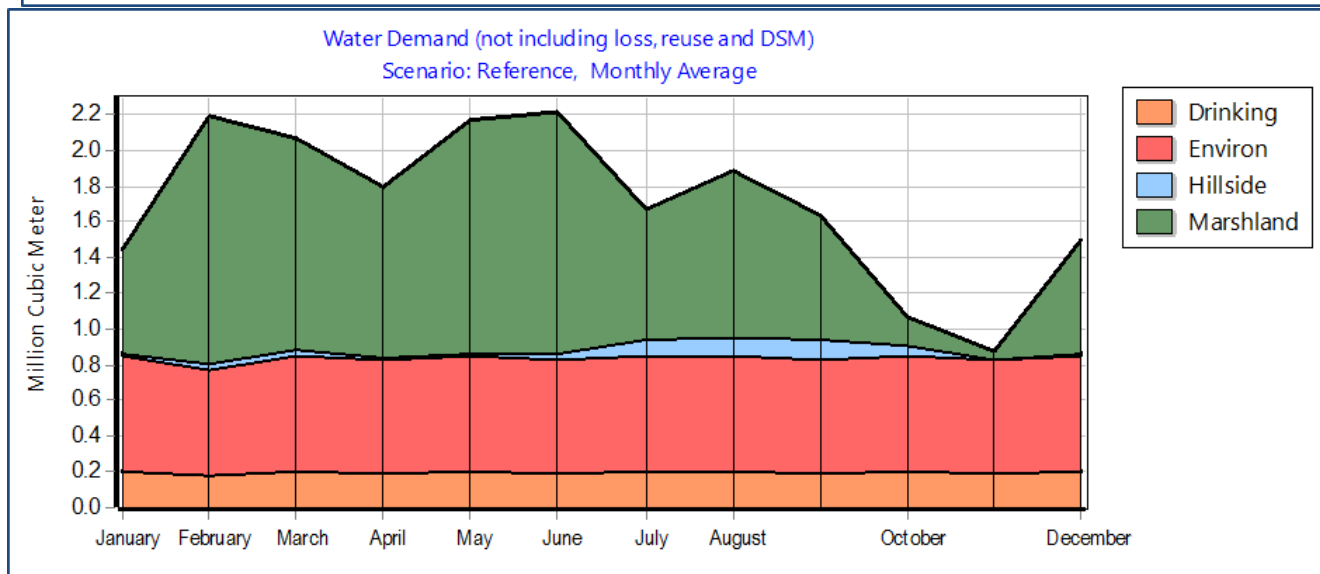
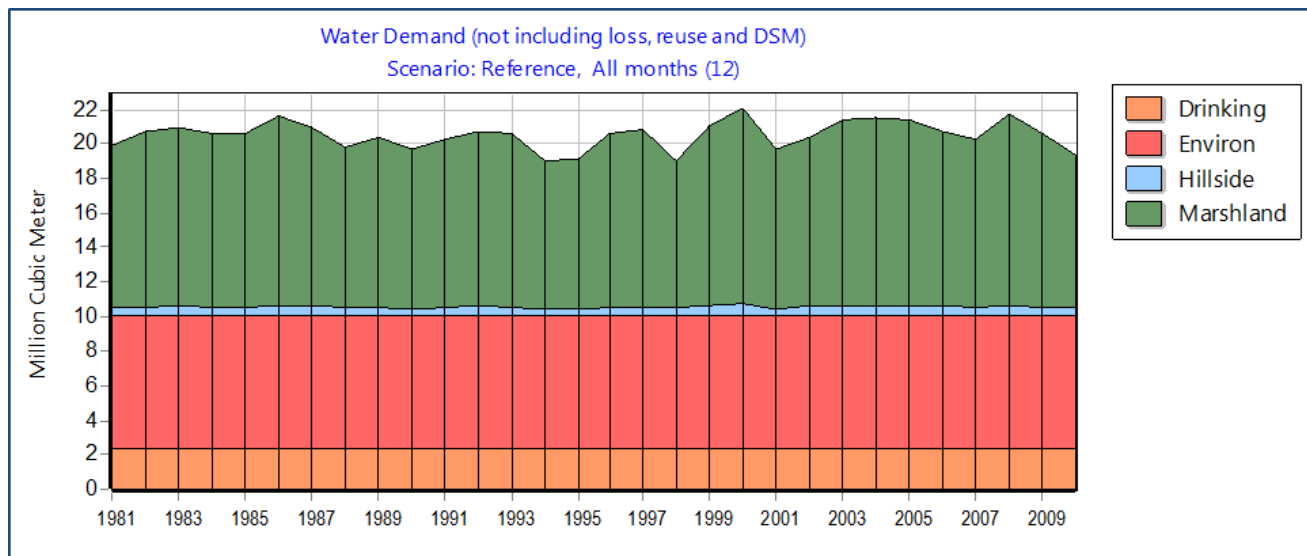
Reservoir Inflows and Outflows
Scenario: Reference, All months (12), Reservoir: Muhazi



Reservoir Inflows and Outflows
Scenario: Reference, Monthly Average, Reservoir: Muhazi



Water demand, annual and monthly



Future scenarios

Horizon	Water supply projections (m ³ /day)			
	Rwamagana	Kayonza	Gatsibo	Total
2017	3,700	2,800	0	6,500
2020	8,482	9,191	0	17,673
2025	10,074	11,730	0	21,804
2040	16,877	24,386	10,627	51,890

Horizon	Irrigation projections (ha)		
	Marshland	Hillside	Total
2017	480	50	530
2020	690	100	790
2025	1,000	1,000	2,000
2040	6,000	6,000	12,000



Future scenarios (con't)

These development scenarios are combined with various climate projections:

- Current
 - 2040 RCP4.5
 - 2040 RCP8.5
 - 2090 RCP4.5
 - 2090 RCP8.5
-
- Sedimentation of Lake Muhazi

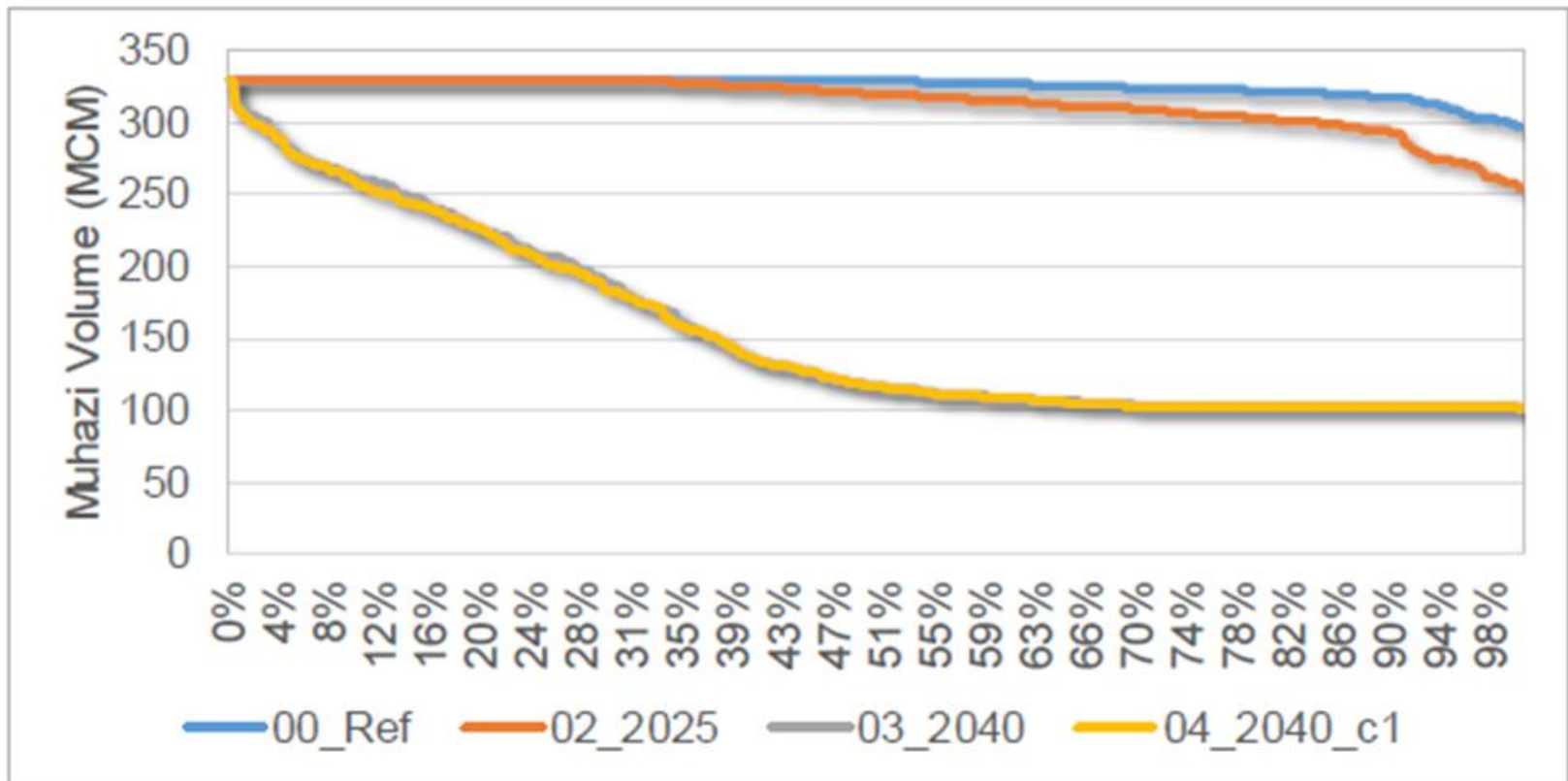


Future demands and shortages

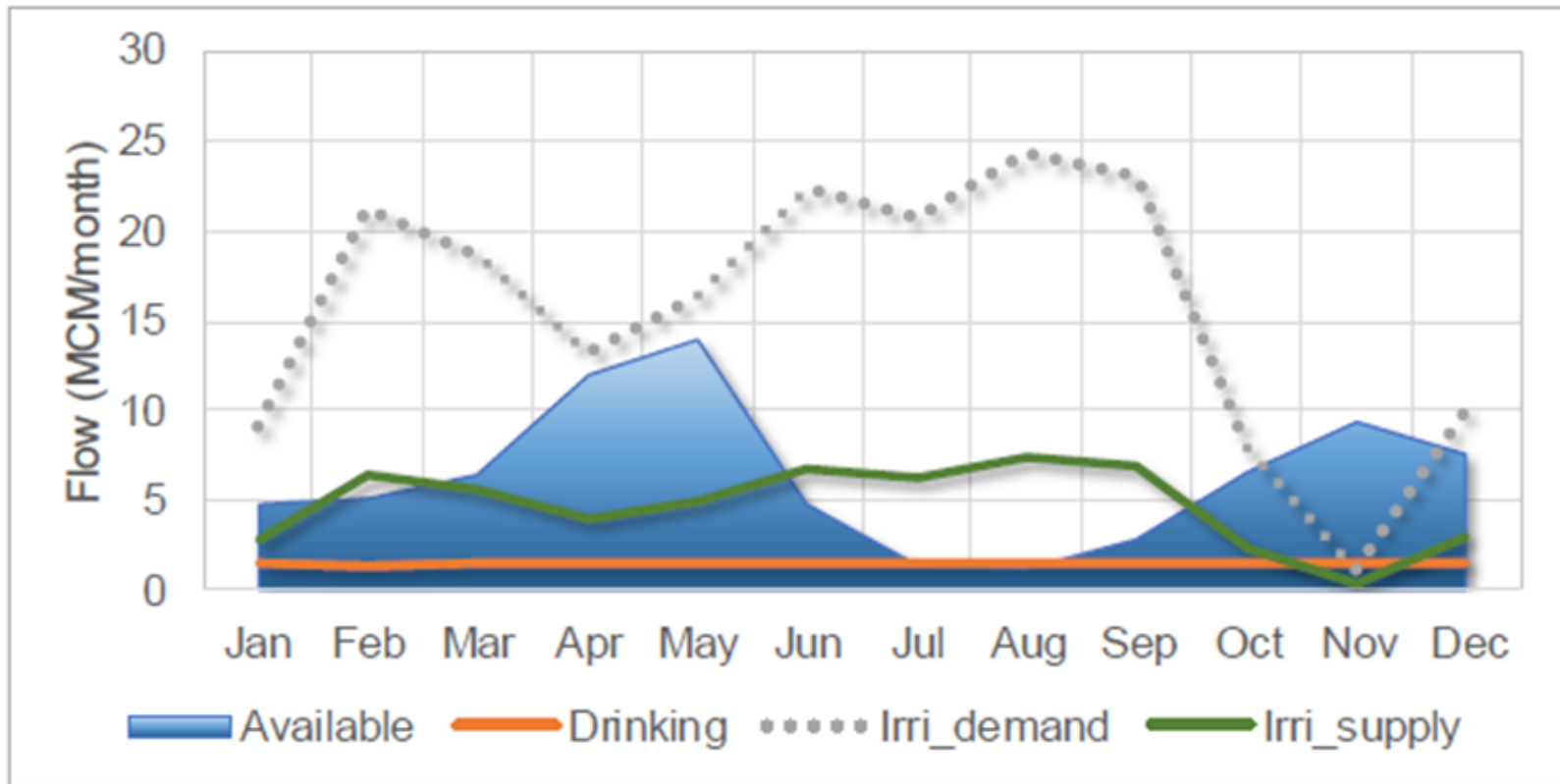
SCEN	Demand Drinking (MCM/y)	Demand Irrigation (MCM/y)	Demand Environment (MCM/y)	Shortage Drinking (MCM/y)	Shortage Irrigation (MCM/y)	Shortage Environment (MCM/y)
00_Ref	2.4	11.5	5.0	0.0	0.0	0.0
01_2020	6.5	16.9	5.0	0.0	0.0	0.0
02_2025	8.0	33.5	5.0	0.0	0.0	0.0
03_2040	19.0	164.1	5.0	1.8	56.0	0.5
04_2040_c1	20.1	172.2	5.0	1.9	59.6	0.5
05_2040_c2	20.5	175.1	5.0	1.8	57.2	0.4
06_2090_c1	20.8	177.5	5.0	1.8	57.8	0.4
07_2090_c2	22.7	191.5	5.0	1.3	53.8	0.3
08_2040_c1_s	20.1	172.2	5.0	2.8	62.3	0.7
09_2040_c2_s	20.5	175.1	5.0	2.5	59.9	0.6
10_2090_c1_s	20.8	177.5	5.0	3.4	65.5	0.8
11_2090_c2_s	22.7	191.5	5.0	2.6	60.0	0.6
12_2040_c2_inc50	20.5	175.1	5.0	0.7	54.0	0.2



Percentage of time exceeded of Muhazi storage in a period of 30 years under some selected scenarios.



Operational rules



Inflow, demand and supply for an average year





Thank you very much



WATER for GROWTH RWANDA