

Integrated Management of Transboundary Water Resources Under Climate Change in the Blue Nile River Basin

Contents:

- 1. Background,**
- 2. Objective,**
- 3. Data Collected,**
- 4. Analysis,**
- 5. Assessment of CC,**
- 6. Main finding, and**
- 7. Q & A.**

B.N. Sub-basin

3: Countries

15: Tributaries

Dam:1+3



Background

The Nile river basins:

- **Nile Equatorial lakes (L.V., and Sudd Swamp),**
- **Eastern Nile Basins**

Models:

- RegCM3
- WEAP

Objectives

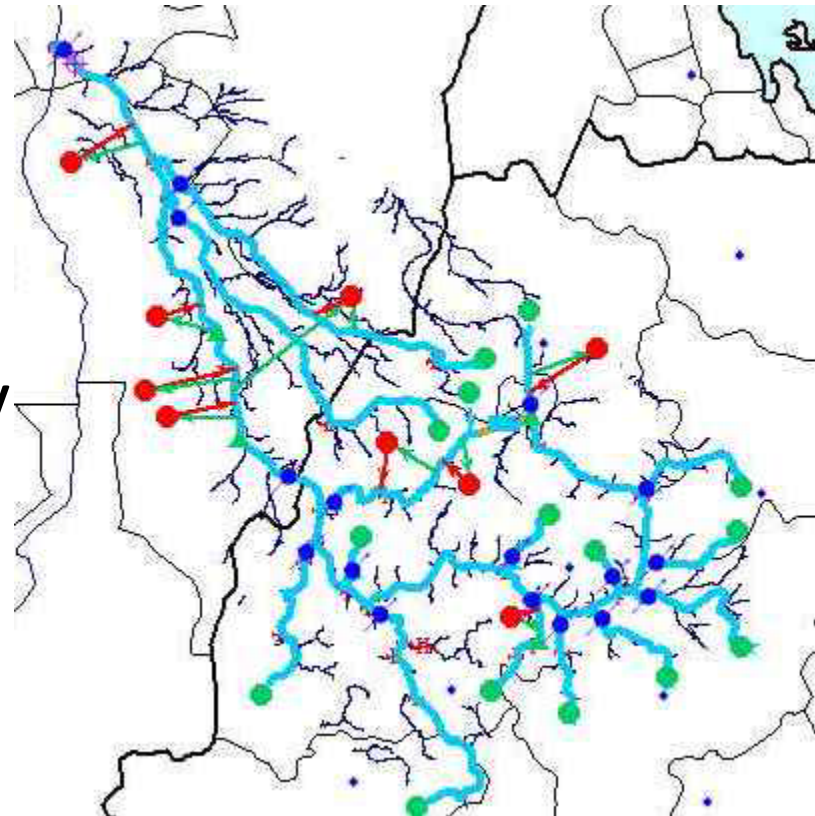
- ❑ To provide a basis for sustainable water resource development;
- ❑ Studying impacts of climate change on hydropower.
- ❑ Water management strategies.

Data Collection

The major input data for the model application are:

- Stream flow data,
- Irrigation water demand,
- Hydropower demand,
- Reservoirs data,
- Water demand, and
- Climate changes.

supply



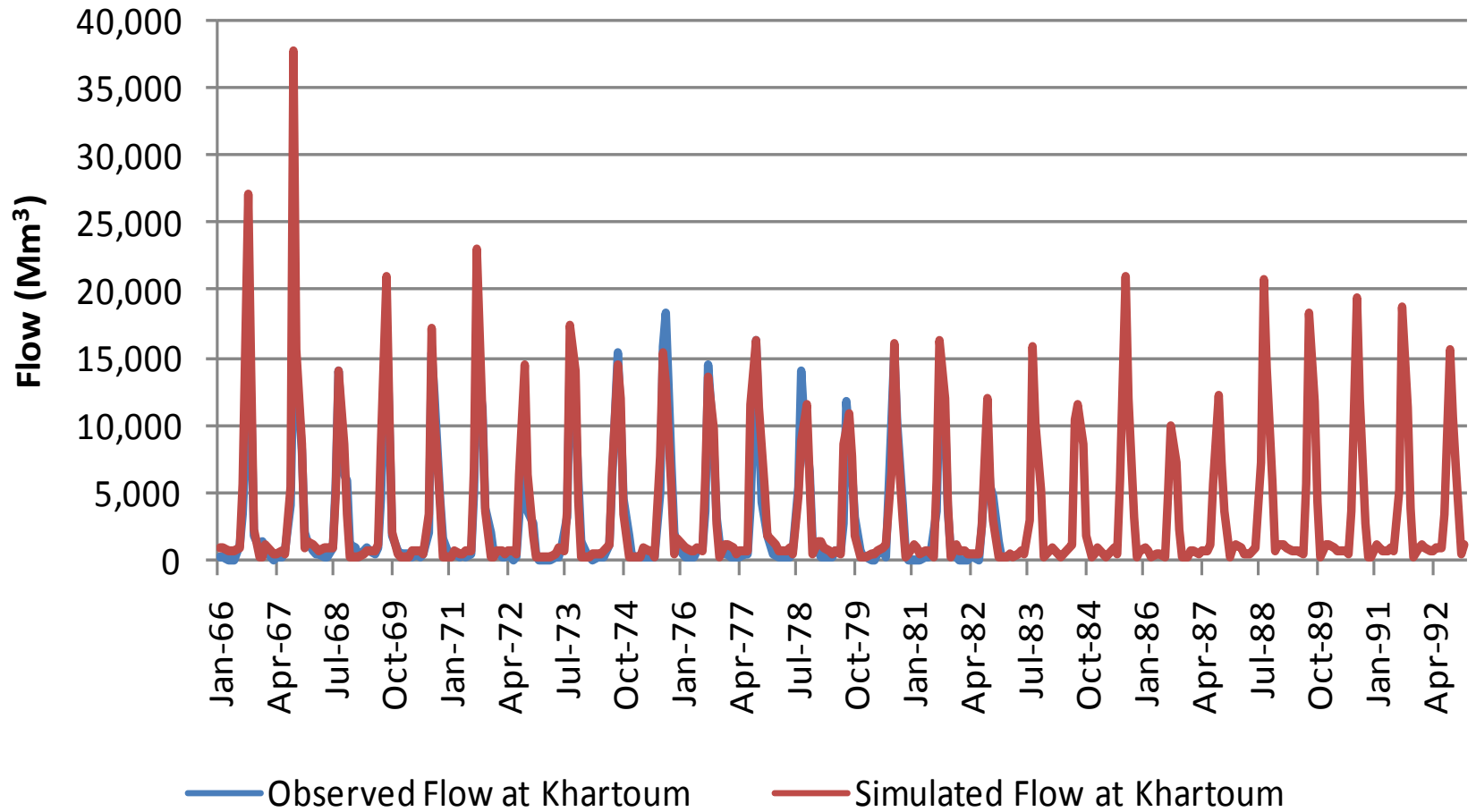


Figure (1): Simulated and observed flow series flows for the Blue Nile (current situation) at Khartoum

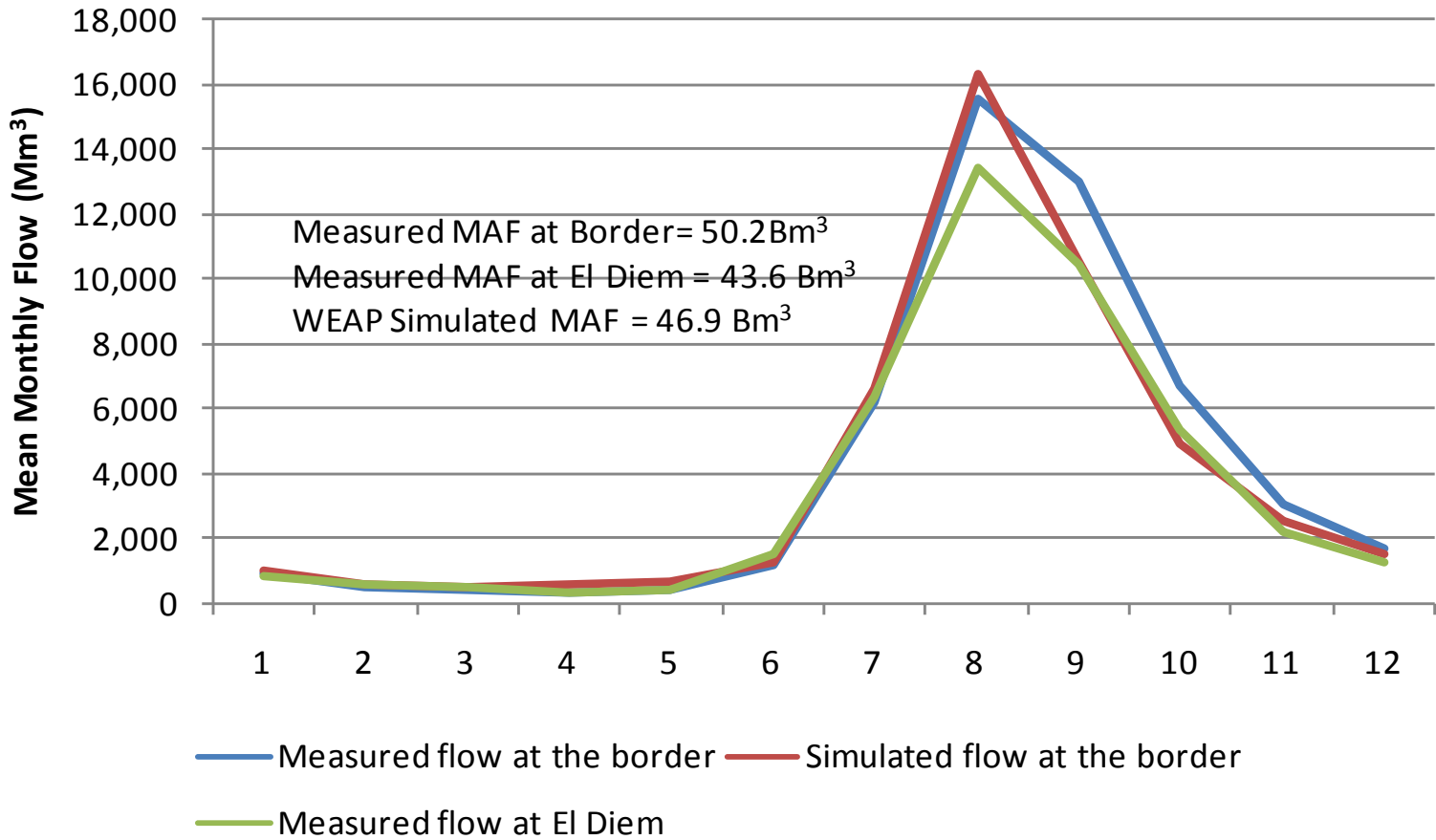


Figure (2): Simulated and observed ,mean monthly flow series for the Blue Nile (current situation) at the Ethiopia-Sudan border

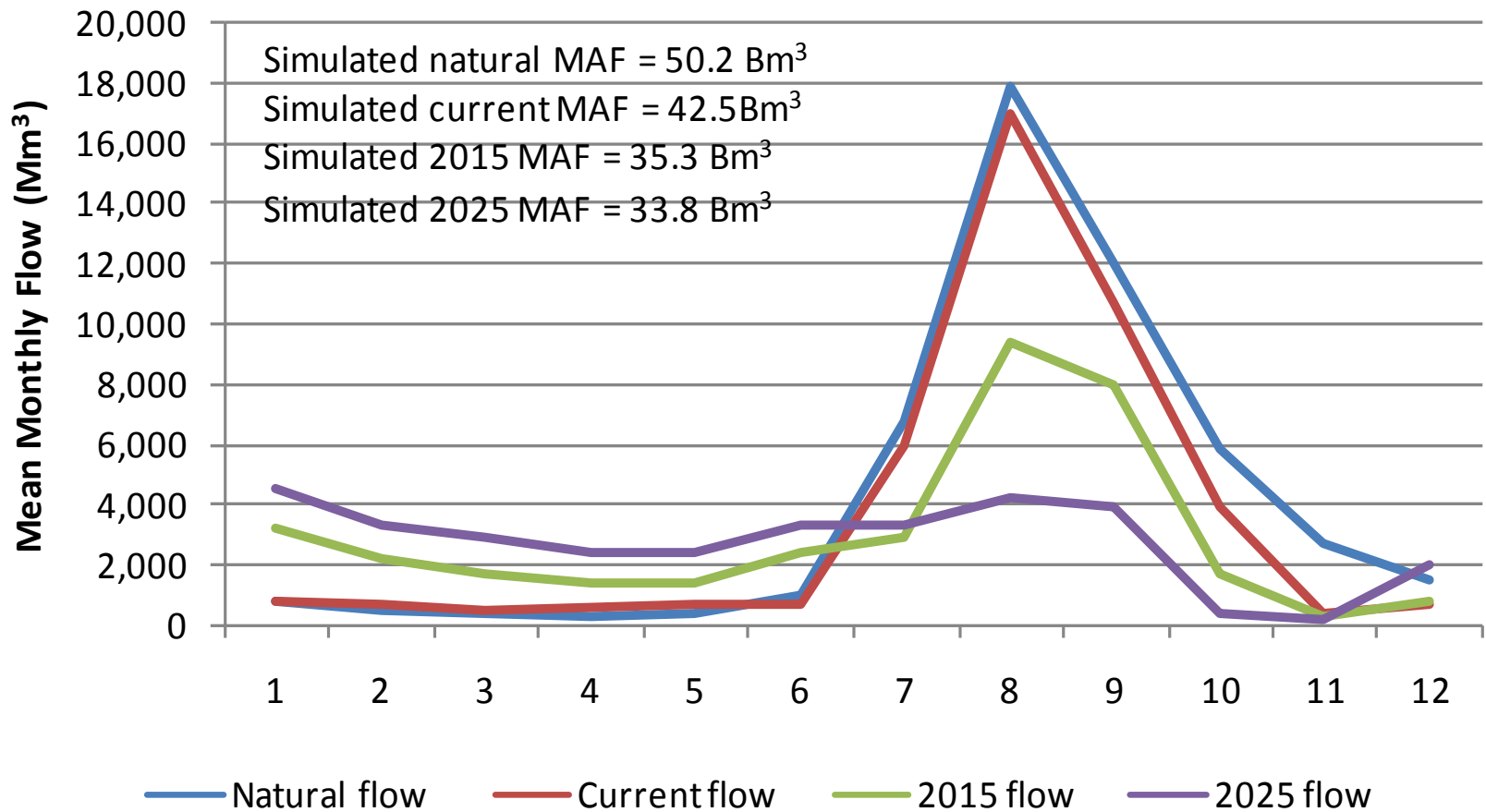


Figure (3): Comparison of simulated mean monthly flow derived for natural, current, 2015, and 2025 scenarios at Khartoum

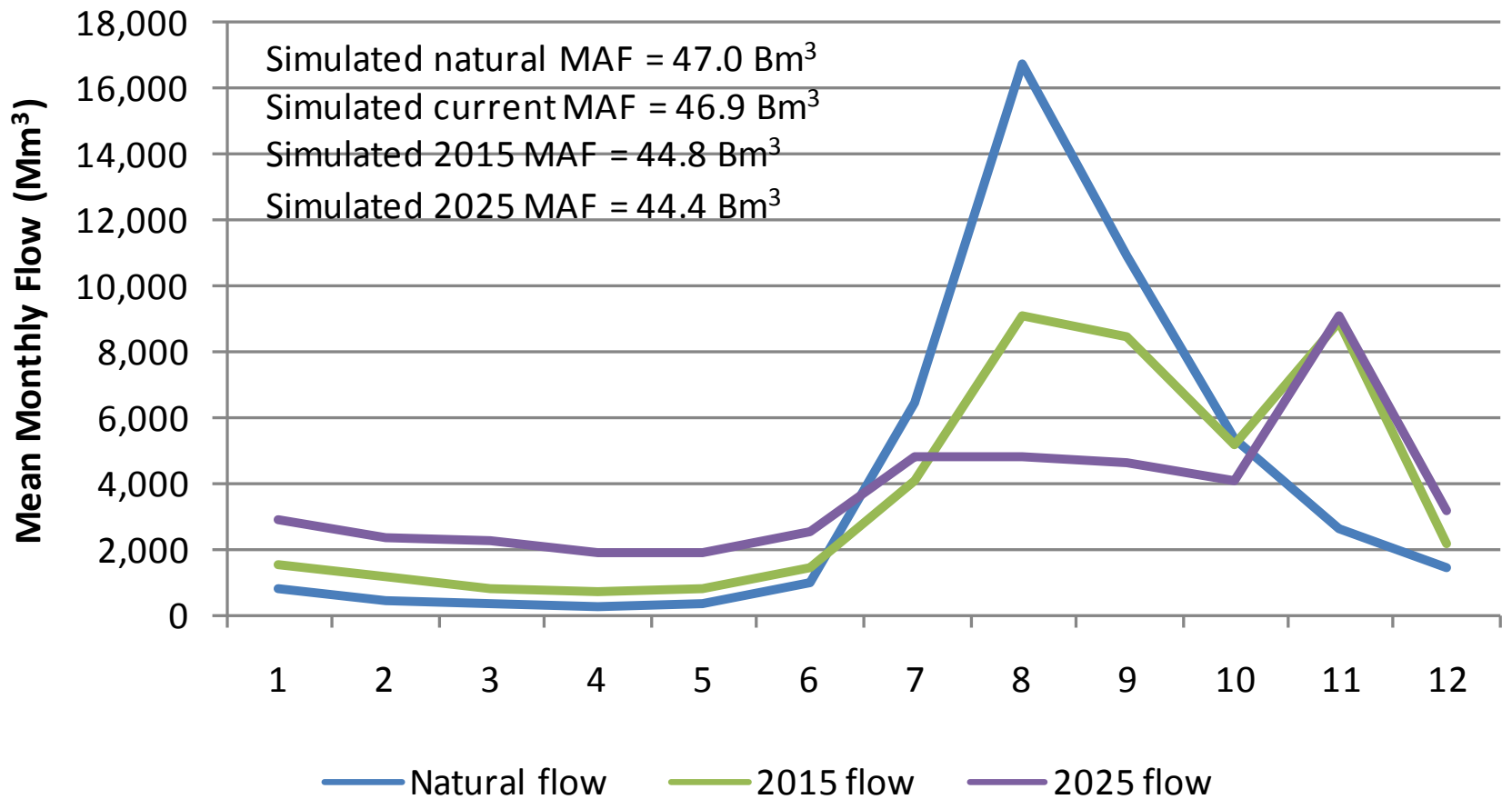
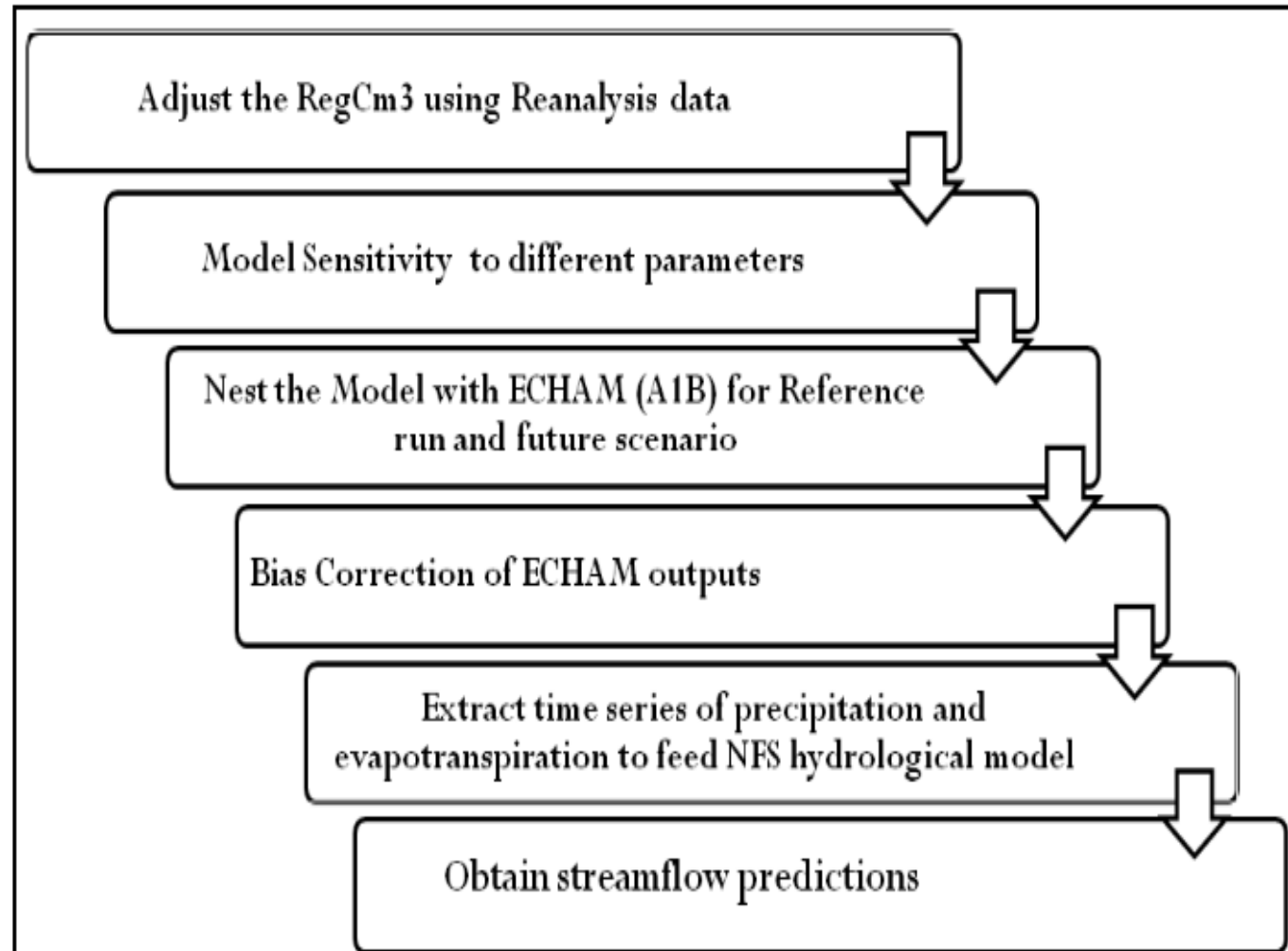


Figure (4): Comparison of simulated mean monthly flow derived for natural, current, 2015, and 2025 scenarios at the Ethiopia-Sudan border

Analysis

A climate change scenario for Eastern Nile basin was developed using RegCM3. Application methodology of RegCM3 over the study area using ECHAM .



Blue Nile Sub-Basin

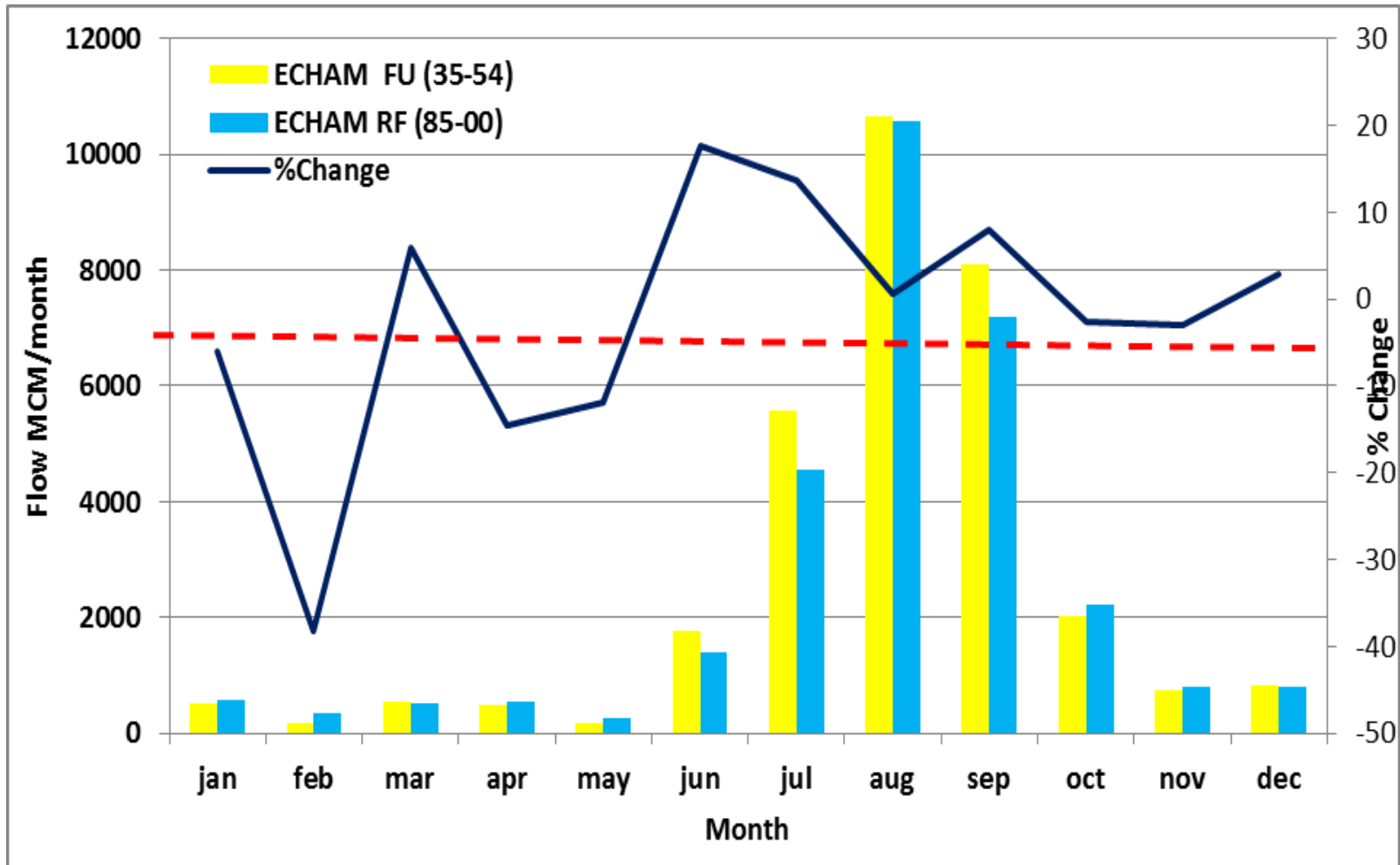


Figure (5): Changes in Mean Monthly Stream flow of the Blue Nile at Diem;

Assessment of CC on Hydropower Production

Four scenarios were developed:

1. Exogenous,
2. endogenous.

Exogenous scenarios include the recent and future climate change scenarios {Reference Scenario (Ex 00), and the Future Scenario (Ex01)}.

Endogenous scenarios include water resource management for hydropower production before and after the GERD dam in Ethiopia.

Scenarios	Energy in Ethiopia (GWh)	Energy in Sudan (GWh)	Energy at HAD (GWh)
After GERD	15325	10973	6024
Before GERD		7852	6465
Different in GWh		3121	-441
Different in %		40	-7

Table 1: Energy production (GWH) in each country from different combinations of the reservoirs

Scenarios	GERD	Rosaries	Sennar	Merowe	HAD	Eastern Nile	
						GWH	Diff (%)
without GERD		2200	131	5521	6445	14297	
GERD only	15324	3397	131	7445	6024	32321	126

Table 2: Mean annual Energy generation (GWH) of each reservoir for different scenarios

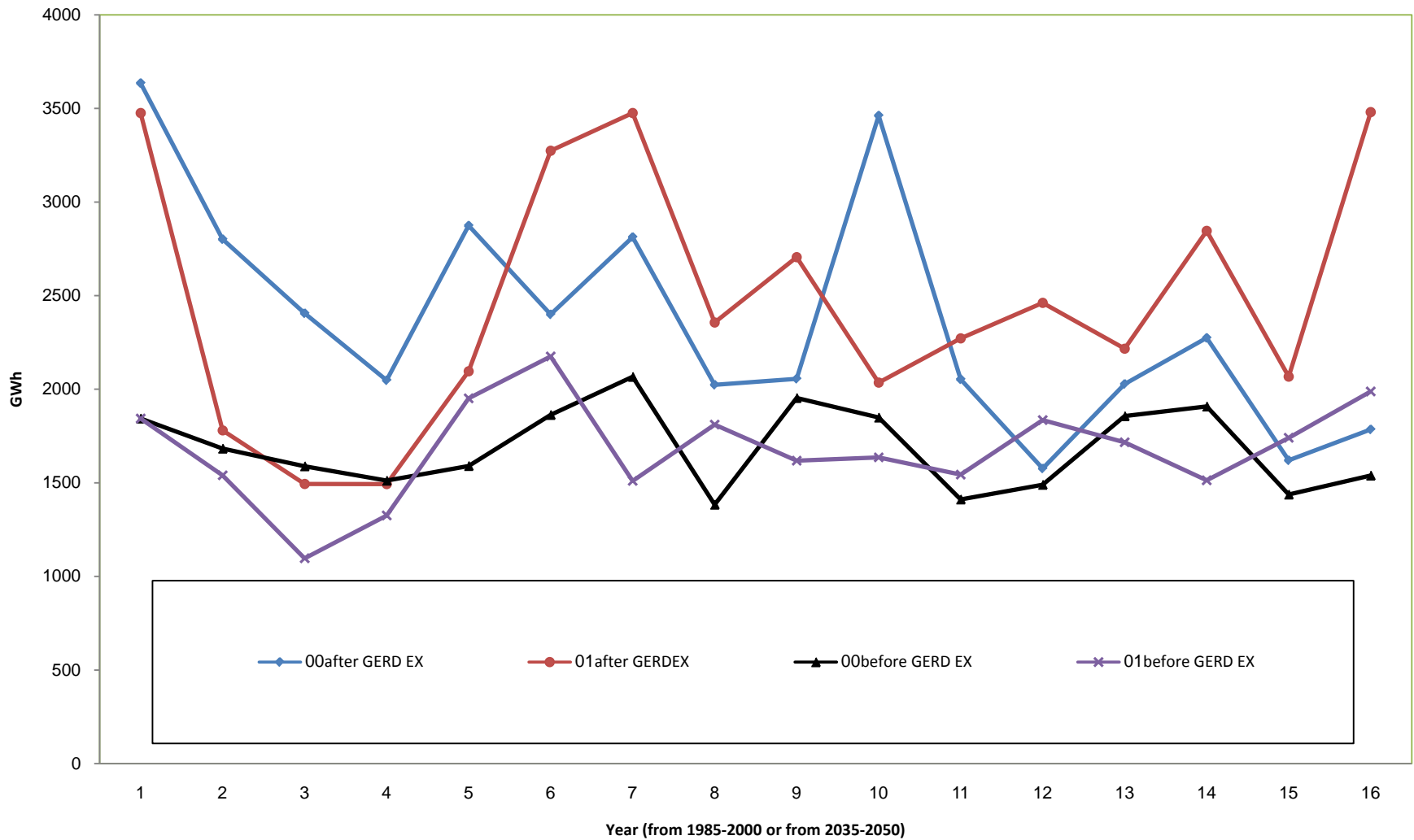


Figure (6): Mean annual energy generation at Rosaries (GWH)

Main findings

1. The runoff from three sub-basins of Eastern Nile will likely increase resulting in more flooding events and more water availability.
2. The future climate change scenario over the eastern Nile will likely enhance the annual energy production at both regional as well as country energy profile after 50 years.
3. There is no significant increasing or decreasing trend of meteorological drought conditions over the upper Blue Nile basin where the bulk of water is contributed to the Nile.

4. The mean annual energy production increased by 7%. As shown in Figure 4.10, increase in energy production is higher during the wet seasons and reduces during the dry season.
5. Energy production in Sudan from the three reservoirs of Rosaries, Sennar and Merowe dams, due to climate change scenario, energy production increases by 46%.

Q & A

What is new?

The new of this research is strengthening regional resilience to Cope With/Adapt with Climate Change Future Risks in the Blue Nile Basin countries.

Q & A

What is the next? to move forward

To move forward, we recommend for future research activities to focus on the following issues:

- Assessing climate change uncertainties and developing procedures.
- Further develop the impact scenario for other hydropower stations.
- Develop an understanding of multi-year drought trends in the basin.

**Thanks for your
Attention**

**شكراً على حسن
الإستماع**