

# **Gash River and Gash delta Water Resources Management Modeling**

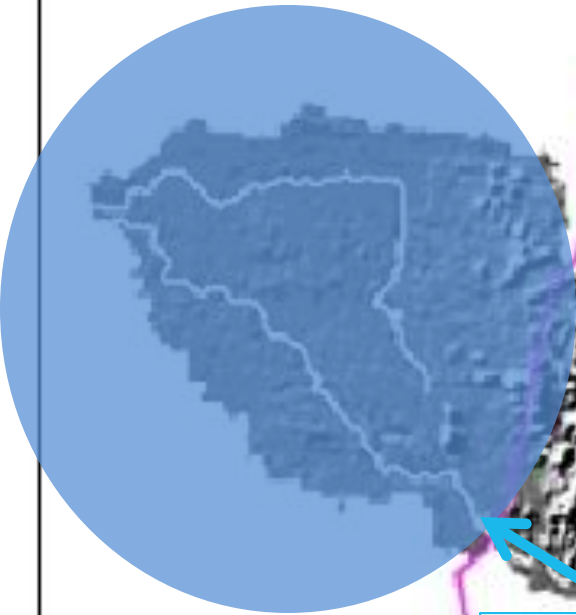
Eng. AbdelNassir Khidr M.; Yasir A. Mohamed

Kassala-April, 2015

# Outlines

- Gash Water Resources System
- Conceptualization of the water allocation model
- What is the RIBASIM model?
- What simulations we will execute?
- What evaluation parameters we will use?
- What do we will see in the simulation results?

# Gash Delta



$Q_{in}$

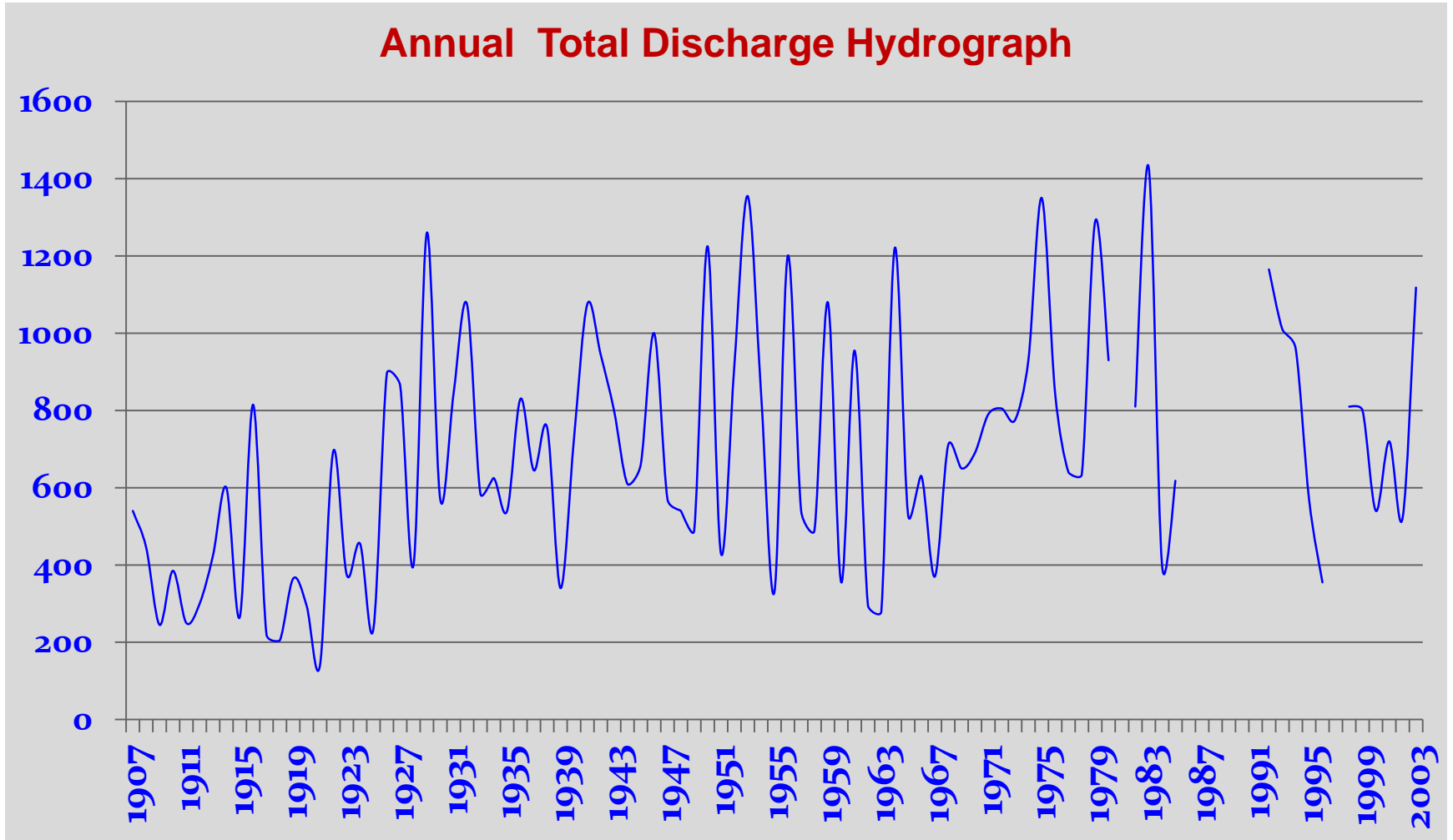


Eritrea

Sudan

Ethiopia

# Gash Water resources



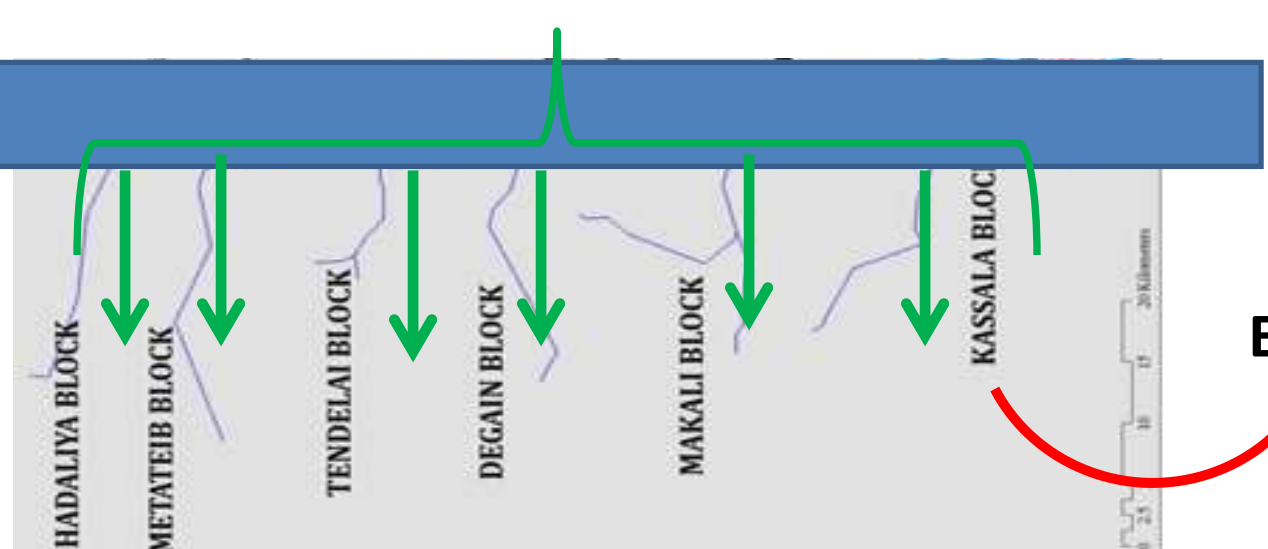
# Water allocation Gash

$Q_{\text{Livestock}}$ , biodiversity

$Q_{\text{die}}$

$Q_{\text{GAS}}$

$Q_{\text{in}}$



ET, yield

$Q_{\text{GW}}$



$Q_{\text{domestic}}$

**RIBASIM:** Is a tool for balancing water supply and demand

### Supply

- Quantity (scarcity, upstream developments)
- Quality Degradation (morphology)
- Cost of Options

### Demand

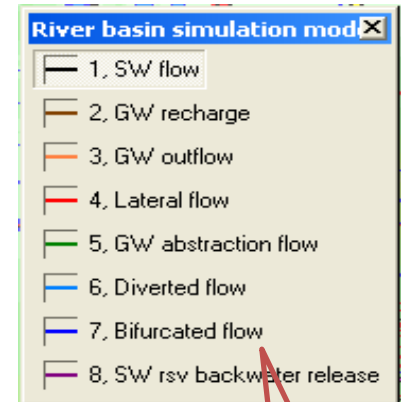
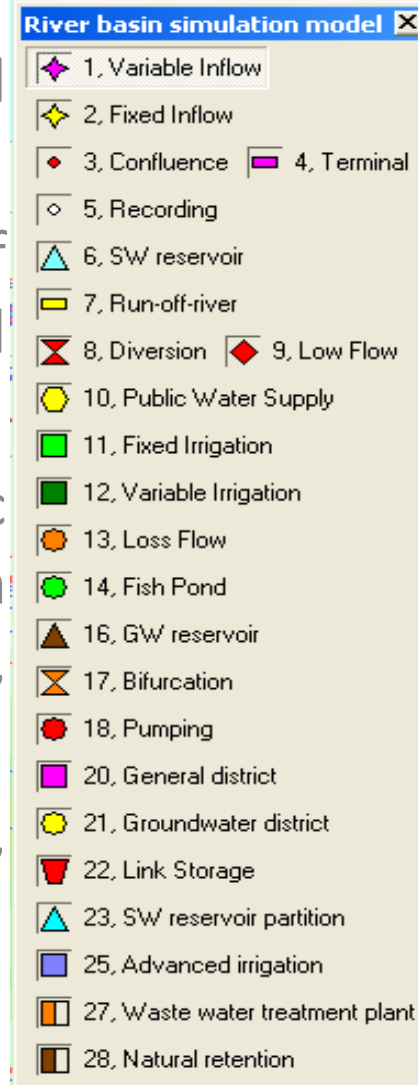
- Population growth
- Increased irrigation
- Increased hydro-power
- Environmental awareness

**IWRM**

**Gash River and Gash Delta**

# River Basin Simulation Model (RIBASIM)

- First step: model schematization.
- **The schematization** consists of a network of nodes connected by branches.
- The **nodes** is: Inflows, public water supply, irrigation demand, Environmental flow, hydropower, delta,...
- The **links** represent river, canal, diversion canal,...



Network building blocks: set of node and link types

# Gash River and Gash Delta simulation Model

The model will assess impact of changes on Gash water resources and use: irrigation supply reliability and the flows to Gash delta (Gash Die).





# Data needed

- ❑ Hydrological series data:
  - precipitation
  - evaporation
  - discharges
- ❑ Existing and future values of water demand:
  - irrigated area
  - domestic water demand
  - etc.....
- ❑ Environmental flow to Gash Die.

# Gash river and Gash delta system Scenarios

A number of **scenarios will be** defined by changing:

- Water supply at ElGeera Hydrological station;
- Irrigation area size;
- Cropping pattern;
- Minimum flow to Gash die;
- Domestic water demand
- etc...

# Evaluation parameters

| Water user      | Parameter                  | Dimension             |
|-----------------|----------------------------|-----------------------|
| Irrigation      | Irrigation supply          | Mm <sup>3</sup> /year |
|                 | Supply reliability         | %                     |
|                 | No. of years with shortage | %                     |
| Gash delta flow | Minimal flow               | Mm <sup>3</sup> /year |

# Expected outputs

Knowing the effect of different potential changes on the upper and the middle parts of the Gash River and Gash delta system on:

- Irrigation supply reliability;
- The flows to Gash delta (Gash Die);
- Effect on GW resources
- Domestic water supply reliability
- etc...

**Thank you**