



## KNOWLEDGE AND EXPERIENCE SHARING SYMPOSIUM

### Towards Highly Rewarding and Inclusive Flood-based Livelihoods

### Towards Improved On-farm Water Management and Higher

### Productivity in Gash Agricultural Scheme in Sudan

*Khalid E.A. Hassaballah*

The Hydraulics Research Center, Wad Medani-Sudan

4<sup>TH</sup> TO 8<sup>TH</sup> MARCH, 2019

VOI WILDLIFE LODGE, TAITA TAVETA COUNTY, KENYA

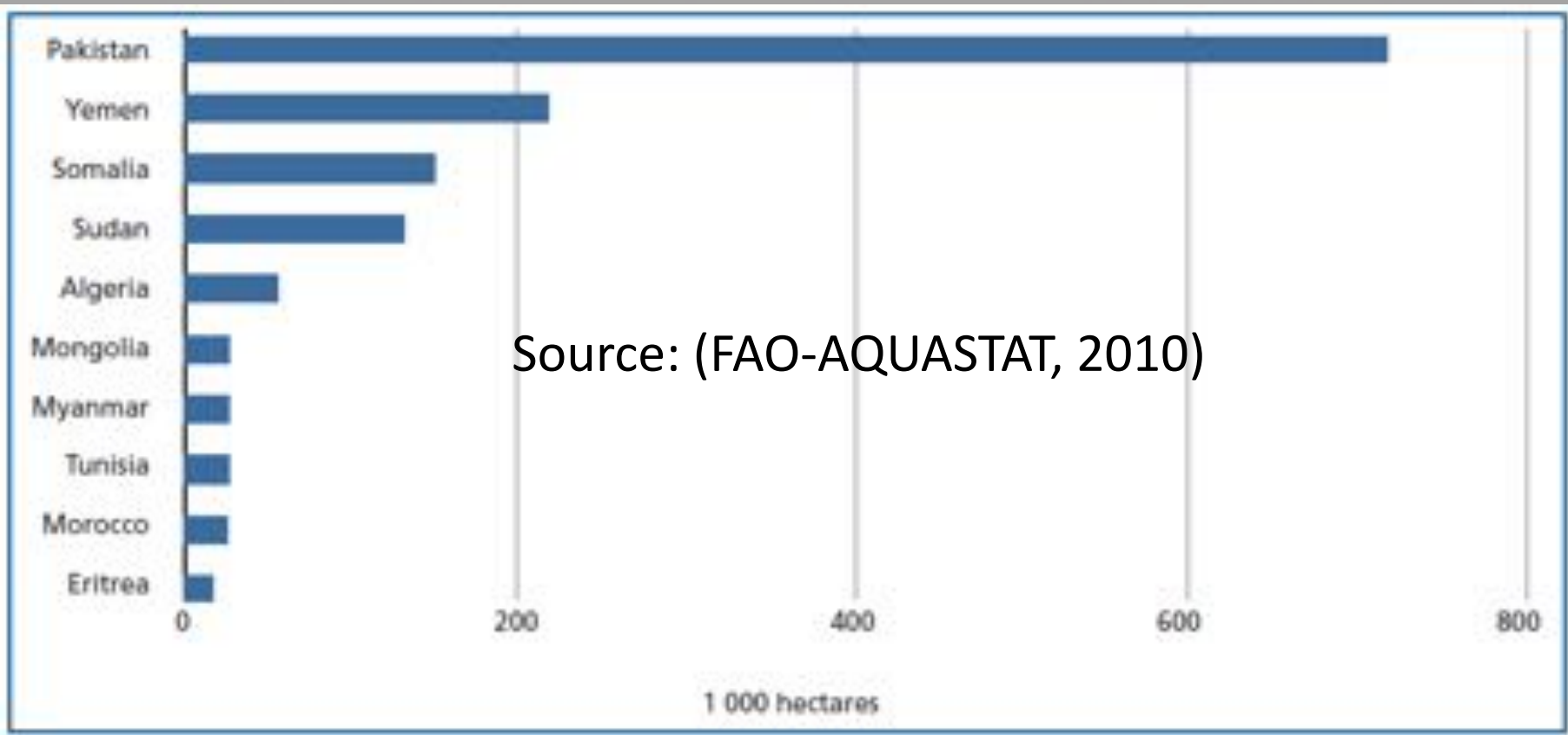
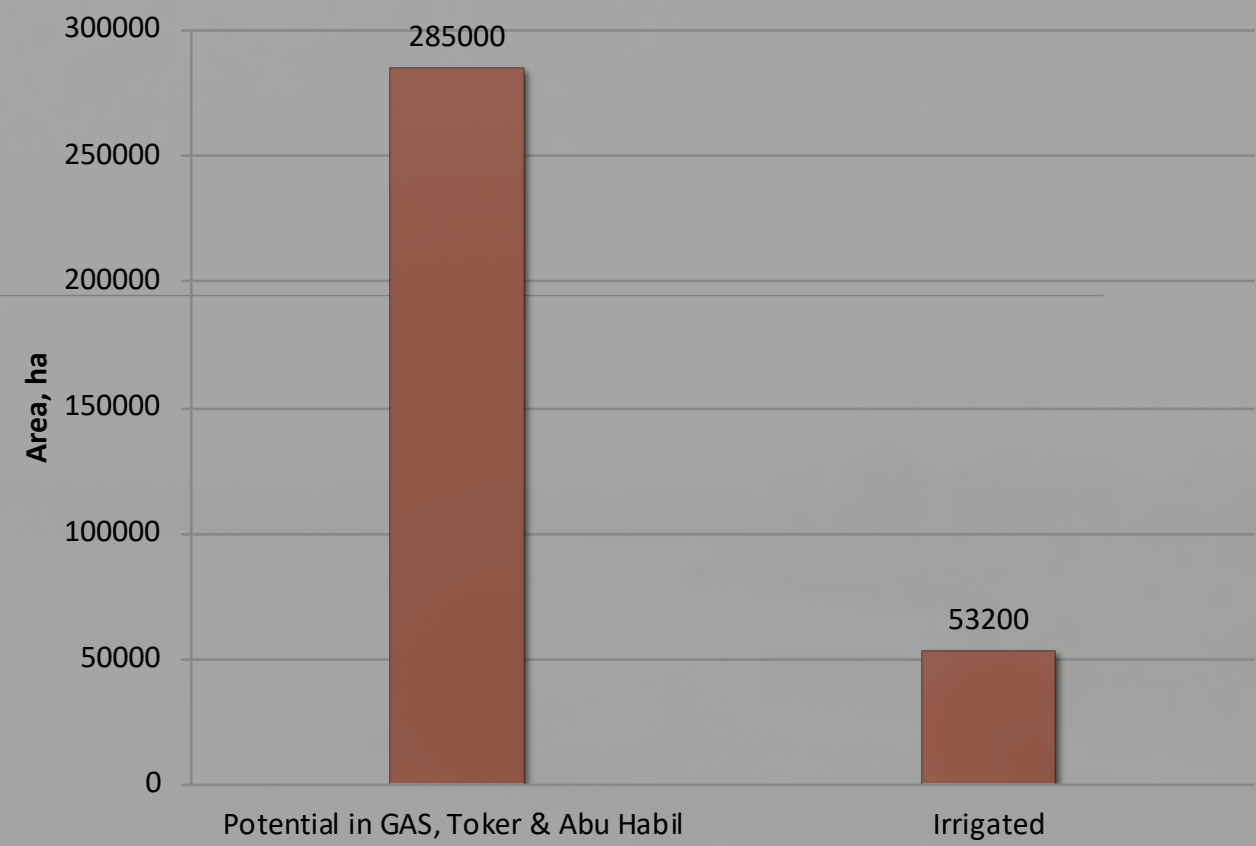


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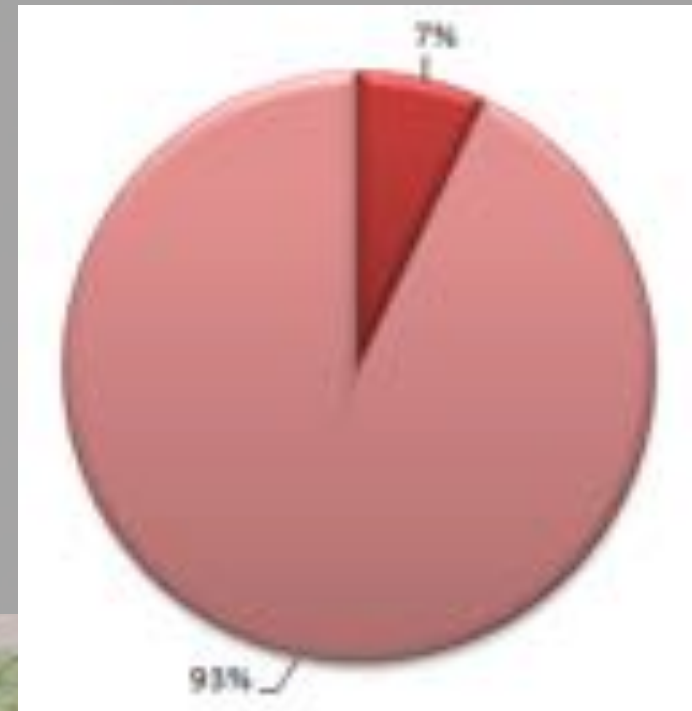
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# FBFSs in Sudan



Source: (FAO-AQUASTAT, 2010)



## About Gash River & GAS

- Catchment is 21,000 km<sup>2</sup>.
- Length is 121 km (border-Gash Die).
- Transboundary catchment (Eretria, Ethiopia and Sudan).
- Flashy floods and high variable flow (650 Mm<sup>3</sup>/year).
- High sediment load.



- GAS is a Spate irrigation scheme.
- Best soil - Class 1 soil.
- Arable land is 120,000 feddans and cropped area is 50%.
- Sorghum is the main crop.
- 87,000 households.



## About the project

IFAD funded project (April 2015 – March 2019)

Leading partner:

MetaMeta Research – The Netherlands

Implemented in Sudan by the HRC-Sudan

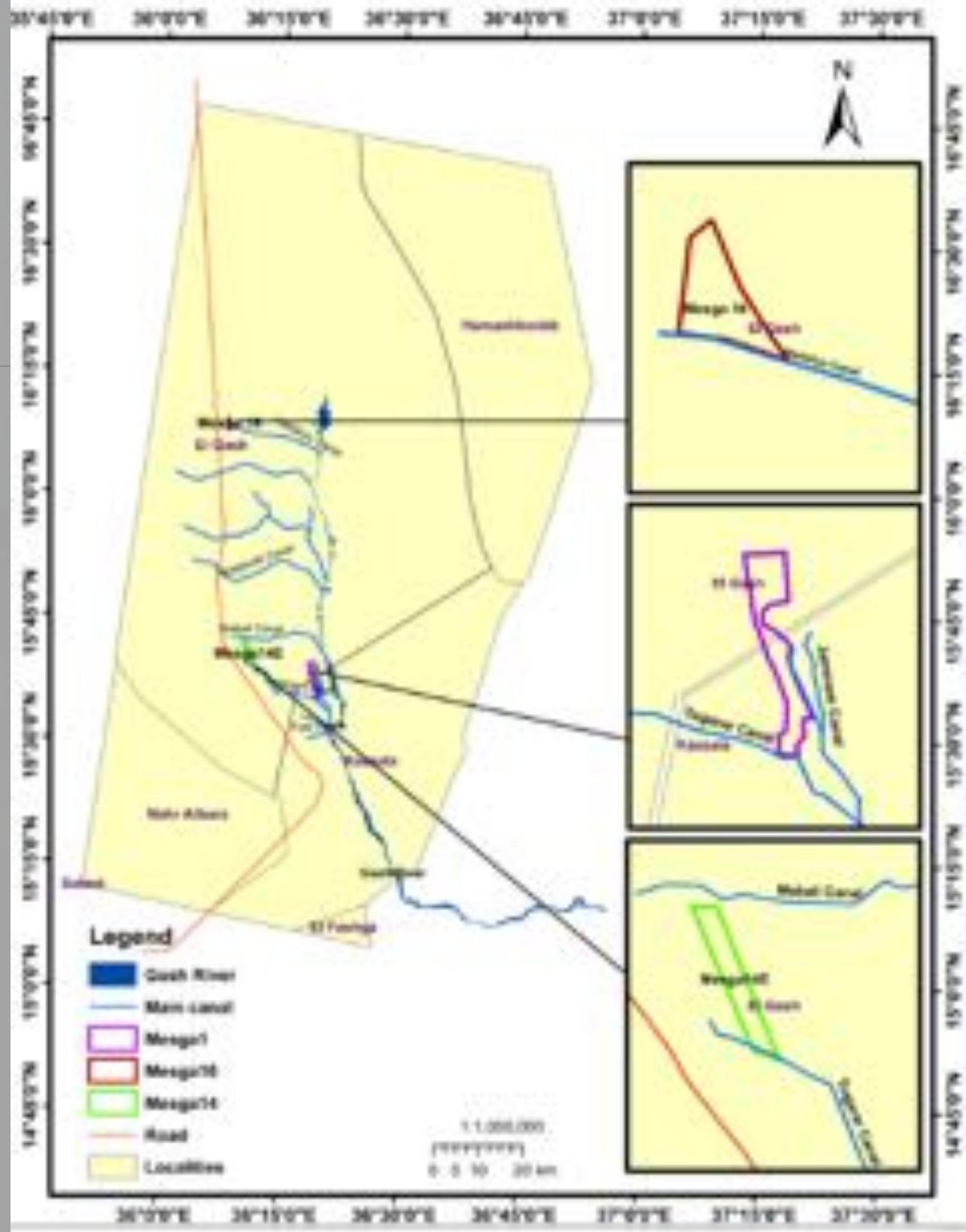
Local partners: MWRIE, Ministry of Agri. (Kassala State), GAS, TDAS, KAAS, GRTU, WUAs (GAS), El Silem Agri. Scheme, Universities, etc...

# Project components

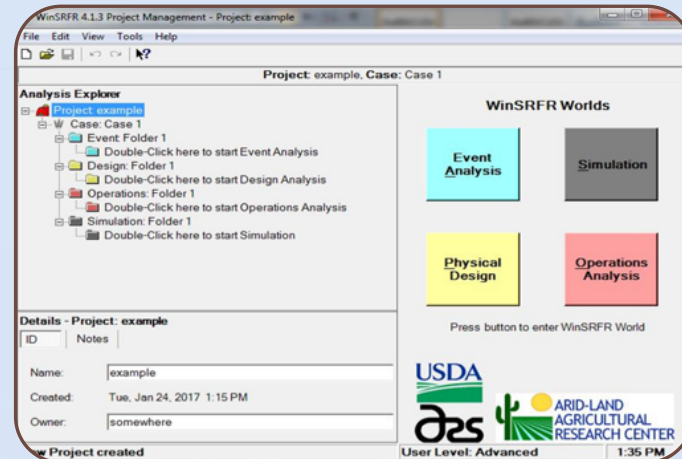


## On farm water management in GAS

*To* introduce an appropriate irrigation schedule in GAS to enhance soil moisture distribution, irrigation efficiency and consequently productivity.



# Research approach 2015 - 2017



Phase I: Baseline investigation (Mesga 1, Kassala Block)

- Flood water quantification
- Soil moisture monitoring (Jun.-Dec.)

Phase II: Modeling (WinSRFR)

- Simulation of different scenarios
- Proposed scenario selection

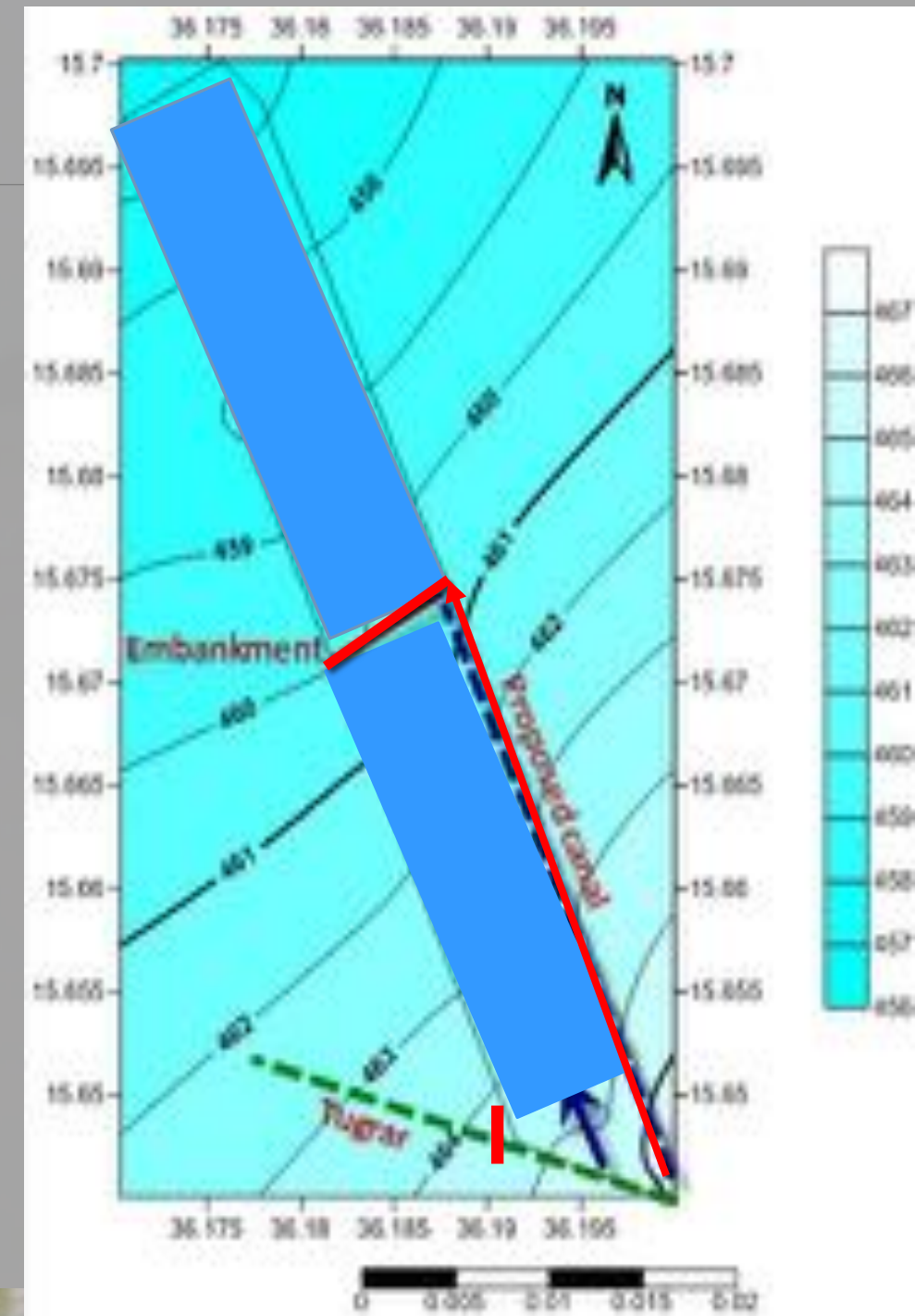
Phase III: Introducing interventions (Mesga 14E)

- Construction works
- Flood water quantification
- Soil moisture monitoring (Jun.-Mar.)



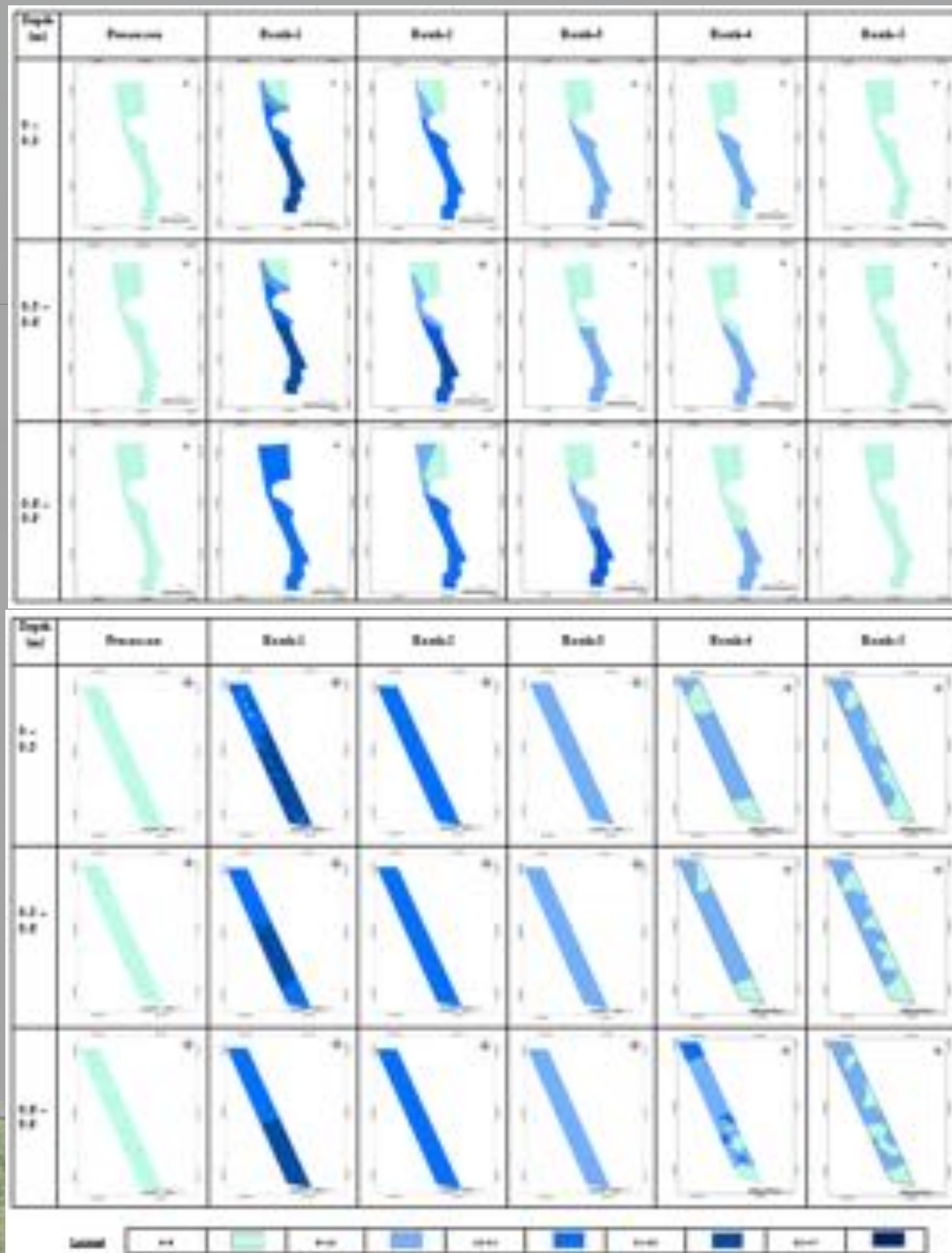
## Adopted interventions (season 2017/2018)

1. Mesga area is 1000 Feddan (420 ha)
2. Dividing the Mesga area equally
3. Construction of tertiary canal (half of the total length of the mesga)
4. Construction of weir



Cont...

Spatial and temporal distribution of soil moisture has been improved.



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8-16

16-24

24-32

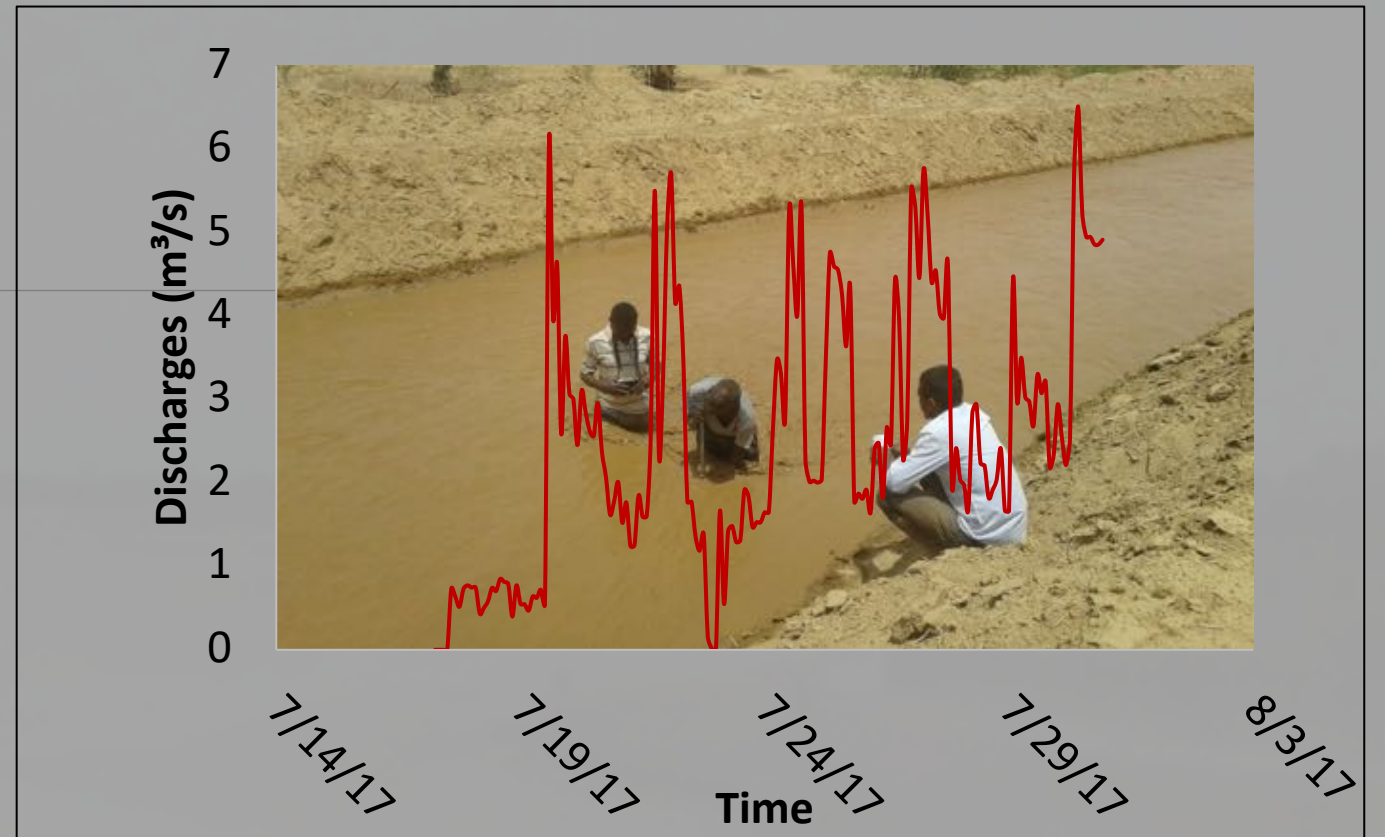
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# Applied research achievements (season 2017/2018)

Number of irrigation days decreased from 15 to 11 days.

Available water has increased (13.3 cm Vs 14.9 cm).

Productivity is enhanced for the two Sorghum varieties.



*Total flow rates entering Mesga 14E in Kassala Block*

Crop variety	Average yield in GAS (Sacks/Feddan)	Yield in pilot farm 2017/2018 (Sacks/Feddan)
Tabat	10-12	11
Aklamoy	5-7	9

1 Feddan = 0.42 ha

## Limitations of the experiment

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1. The constructed Mesga canal does not reach its design capacity during the irrigation period. The achieved average discharge was  $0.8 \text{ m}^3/\text{s}$  while the design is  $2.7 \text{ m}^3/\text{s}$ .
2. Sustainability of the Mesga canal for future use and its condition regarding siltation.
3. The Mesga was not levelled before the growing season. Levelling of flooded land would have good impacts on water distribution.
4. Concerning the manmade breaching on the outer bund to enable water flowing to the first half of the Mesga, it tends to be increased in width due to the loose soil.

*What are the main challenges?*



## Challenges faced

- Delay in finance
- Harsh working environment in GAS
- Access to pilot farms, damaged cars, Mesquite, others, ...



## Experiment replication (season 2018/2019)

- The project worked in 2 mesgas: Mesga 12 W in Kassala Block and Mesga 39 W in Degain Block.
- Until end of the flood season on 30<sup>th</sup> September, 2018, there was not sufficient spate entered the two pilot mesgas.
- Only 20% and 30% of mesga area has been irrigated in Mesga 12W, and 39W, respectively. Therefore, the experiment was stopped.



## Lessons learned

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1. Participation of GAS administration body and farmers, in the research since its early stages, is of utmost importance
2. Selected pilot farms must be in the first irrigation
3. Close observation of water distribution within the mesga area is highly necessary

# Project products

(4) Technical reports / (3) workshop reports / progress reports / many BTORs

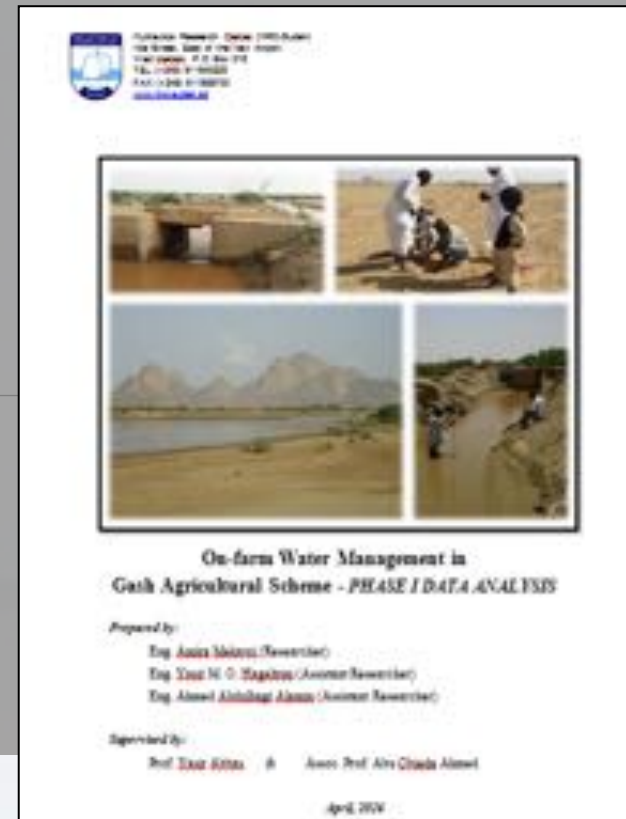
(1) Practical note

Journal paper (under progress)

(2) papers submitted

Conference

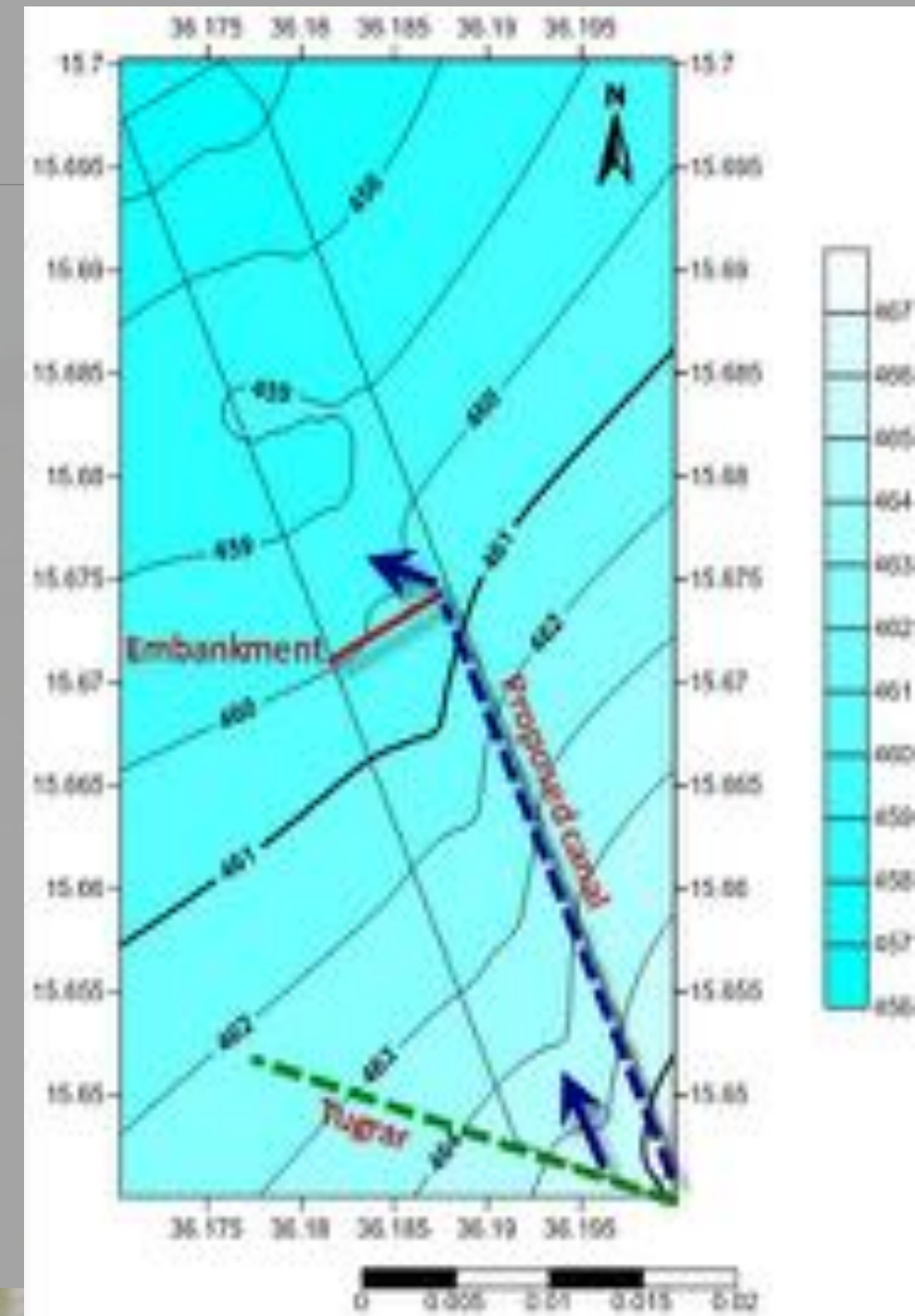
Communication products (5 videos, brochures, ...)





## Experiment replication (season 2019/2020)

1. Experiment will be applied in the same Mesga of 2017 year (Mesga 14E)
2. Two others mesgas will be selected later with typical interventions



# Investment for upscaling the experiment

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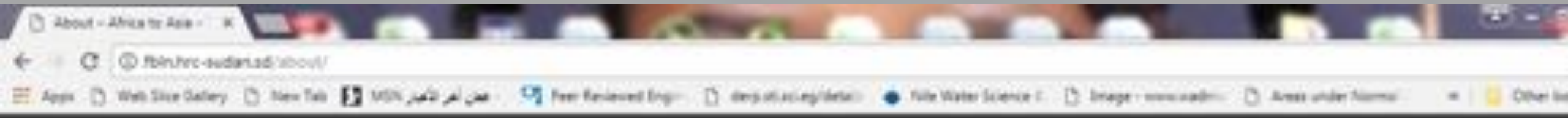
## ➤ The adopted interventions for one mesga costed **13,333 USD**

- ✓ Crop productivity increased twice
- ✓ Water use efficiency has been improved (27% of irrigation duration was saved)

## ➤ Upscaling interventions to the whole scheme (81,000 Feddan with 81 irrigation units) will approximately cost **1,080,000 USD**.

- ✓ Total productivity (if the scheme cropped with Aklamoy) will increase from about 405,000 sacks/year to 810,000 sacks/year ( about **13.6 million USD** additional income)
- ✓ Significant impacts on livelihood in terms of increasing annual income, increasing education opportunities for children, increasing access to health services...etc.

Reach us at: <http://fbIn.hrc-sudan.sd/>



## Africa to Asia - Testing Adaptation in Flood-Based Resource Management Project

Date: April 2015- March 2018



# Thank You for Your Attention

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### About

The research project has started in April 2015 in eight countries. Sudan is one of them. The project is funded by International Fund for Agricultural Development (IFAD) and European Commission (EC) Grant. The duration of the grant is three years. The implementing organization in Sudan is the Hydraulic Research Center (HRC-Sudan) of the Ministry of Water Resources, Irrigation and Electricity.



### Project Objectives

