# On Farm Water Management in Gash Agricultural Scheme (GAS)

Season 2015/2016

This summary describes the research activities carried out by the research team from the Hydraulics Research Center (HRC-Sudan) in the framework of the IFAD funded research project titled "***From Africa to Asia and Back Again: Testing Adaptation in Flood-based Farming Systems***".

The research "On farm water management in Gash Agricultural Scheme (GAS)" aims to evaluate the performance of the existing conventional irrigation system in the Gash Agricultural Scheme (GAS) on farm level. The existing system is based on traditional experience which basically depends on the number of days. The scheme has two irrigation phases. In the first phase, about half of the scheme area is irrigated by flood water for 25-30 days then the next phase takes place. This results in water shortage or excess water supply which can lead to crop failure in the target area. It is worth to mention that this research work will take place in two following seasons in GAS to get concrete results on the practical irrigation procedure in such a spate system.

During the period from June 01/2015 to January 02/2016, intensive data collection and field measurements were carried out in the two selected pilot Mesgas in GAS (Mesga 1 and Mesga 16). The fieldwork focused on 2-hours interval water levels measurements in the off-take structures of the two Mesgas, intensive current-metering measurements and soil moisture measurements in a number of representative sampling locations in the Mesga using both methods of gravimetric and TDR.

All obtained results of the conducted investigation in season 2015/2016 are summarized below:

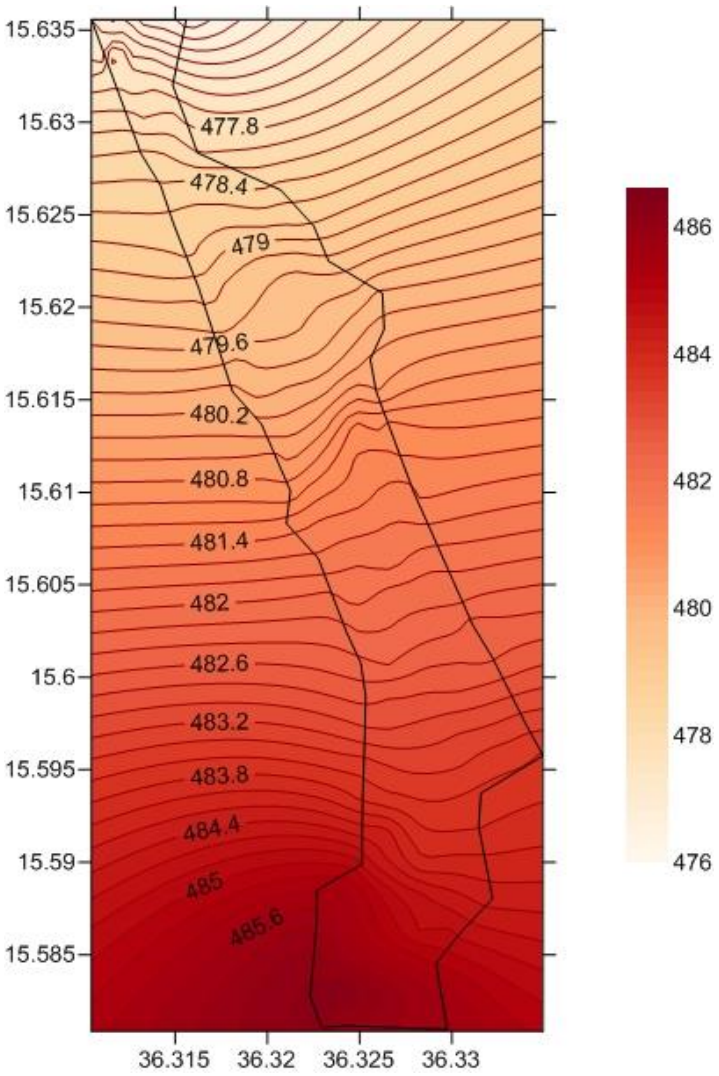
- **Summary of physical and chemical characteristics:**

| Soil property | Mesga 1 | Mesga 16 | Classification |
|---|---|---|---|
| *Physical characteristics:* | | | |
| **SMC, %** | 0.8-18.5 | 2.8-11.6 | |
| **K, cm/hr** | 1.6-4.42 | 2-4.41 | Slow to moderate class |
| *Chemical characteristics:* | | | |
| **CEC, cmol+/kg** | 21-40 | 27-41 | Fertile |

| | | | |
|---|---|---|---|
| **EC, dS/m** | 0.1-0.75 | 0.08-0.6 | Salt free class (0-2 dS/m) |
| **pH** | 6.6-7.7 | 6.9-7.7 | Neutral |
| **N, %** | 0.03-0.81 | 0.04-1.09 | Very low-very high |
| **K, cmol+/kg** | 0.3-1.11 | 0.39-1.11 | Medium-high |
| **P, mg/kg** | 1-6 | 1.29-4 | Low |
| **$CaCO_2$** | 0.12-0.78 | 0.03-0.37 | Very low |
| **$CaCO_3$** | 1.2-5.6 | 3-5.1 | - |

- **Topography of Mesga 1**

A contour map was generated to represent the topographical features of Mesga 1 in Kassala Block. The farm slope decreases towards the farm end and that decrease amounts to 1.67 m per kilometer.



- **Quantification of flood flows entering the pilot farms**

The total measured flow incoming to Mesga 1 (Kassala Block) and Mesga 16 (Hadalya Block) was estimated at 4.7 Million $m^3$ and 1.29 Million $m^3$, respectively.

- **Soil moisture analysis**

Detailed results of the soil moisture contents of the two pilot farms, as obtained from laboratory analysis for all soil samples taken on different intervals all through the growing season, can be found in the technical report. However, few major points can be stressed on. It was obvious that the trend of soil moisture decreases towards the end of the farm in Mesga 1 as shown by the figure below. It was also observed that by harvesting time soil moisture condition in Mesga 1 has almost reached the condition of pre-season.