Food and Agriculture Organization of the United Nations

CIHEAM IAM BARI

AgWA
Partnership for agricultural water for Africa

Emerging practices from Agricultural Water Management in Africa and the Near East

Thematic Workshop

Theme 5

Technology

Dr. Tobias Siegfried

28 August 2017

Theme 5:
Technology

PRESENTATION OUTLINE

- Background
- discharge.ch Technology
- Implementation
- Results
- Outcomes & Findings
- Discussion & Conclusions
- Special Thanks

Food and Agriculture Organization of the United Nations

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Thematic Workshop

Theme 5

Technology

Alternative techniques to canal measurements

28 August 2017

FAO LAND&WATER

Theme 5:
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BACKGROUND

iMoMo Innovation Project

- Fostering innovation in low-cost, high-tech, non-traditional, people-centered observations and monitoring.
- Modernization of pathway from observation to decision-support.
- Long-term support by the Swiss Agency for Development and Cooperation (SDC)

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BACKGROUND

Looking Beyond Traditional Monitoring

- Traditional station data (static observation network)
- Remotely sensed data (auxiliary data)
- *Non-traditional, crowd-sourced data (dynamic observation network)*

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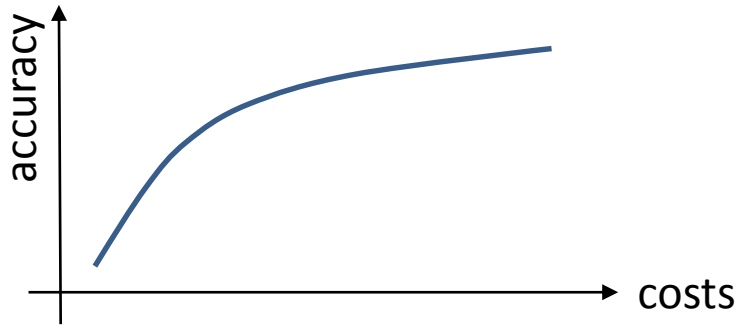
BACKGROUND

Traditional Observations	Non-traditional Observations
+ Automatic / Autonomous	- Human Factor
+ High Accuracy	- Less Accuracy
+ High Frequency	- Intermittent Data
- Costly	+ Low-cost & scalable
- Requires expert knowledge	+ Amateur proof
- Vandalism	+ Vandalism not an issue



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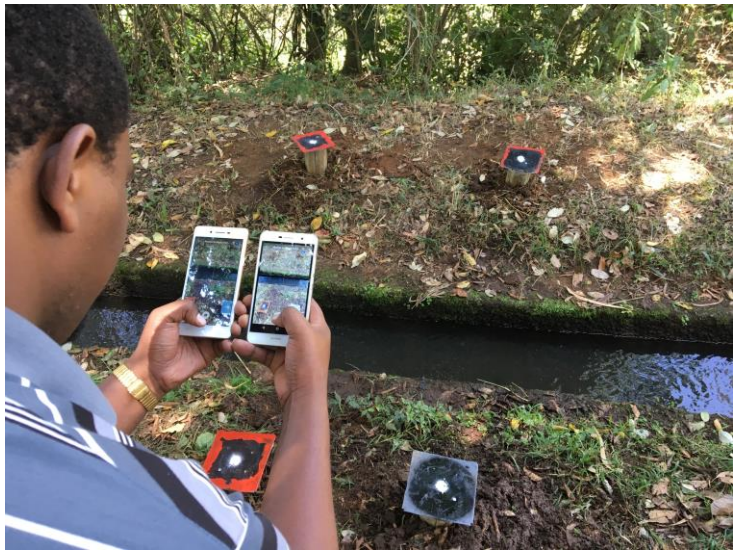
BACKGROUND

Definitions

- Crowd-sourced data collection is monitoring conducted, in whole or in part, by amateurs and/or non-professionals.
- Crowd-sensing is crowd-sourced, participatory monitoring.



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TECHNOLOGY

Measuring Discharge with a Smartphone

photrack ag
flow measurements

hydrosolutions

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Agency for Development and Cooperation SDC

discharge.ch

GET IT ON Google Play

TECHNOLOGY

Measuring Discharge with a Smartphone

- **Site identification, setup and calibration**
- Measure
- Synchronize with Cloud
- Manage data on website

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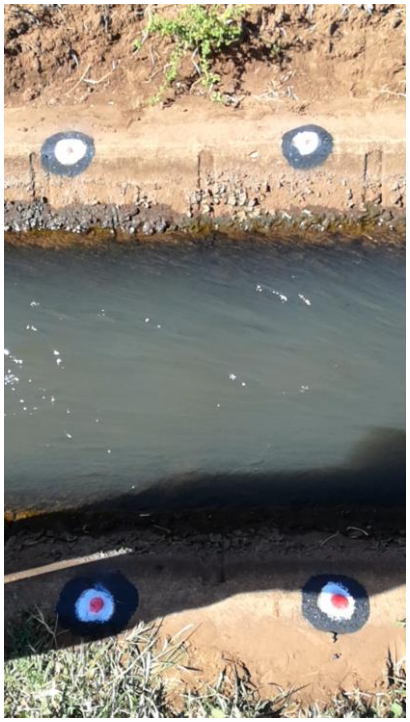

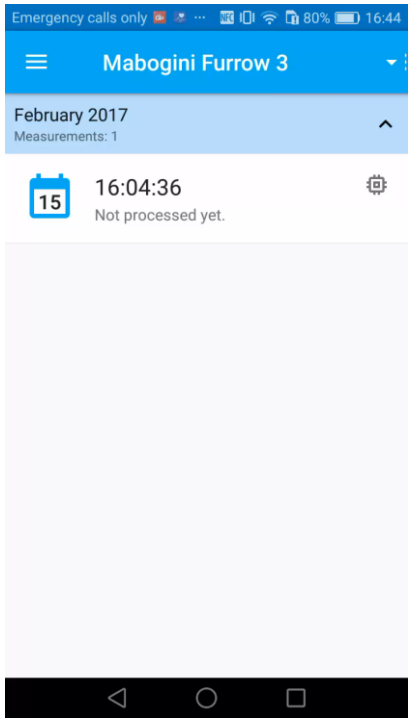

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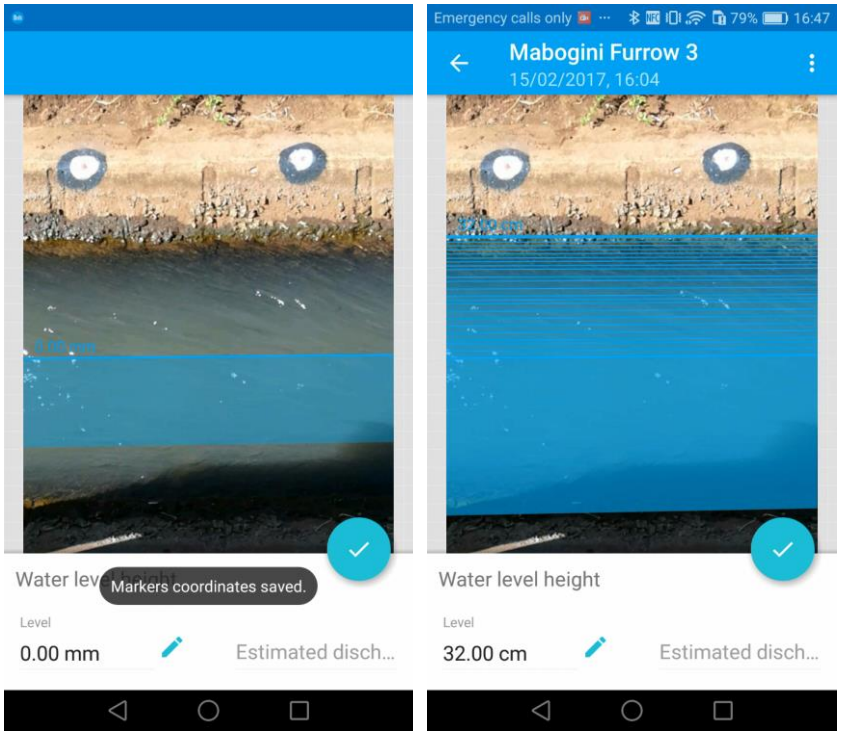

Theme 5:
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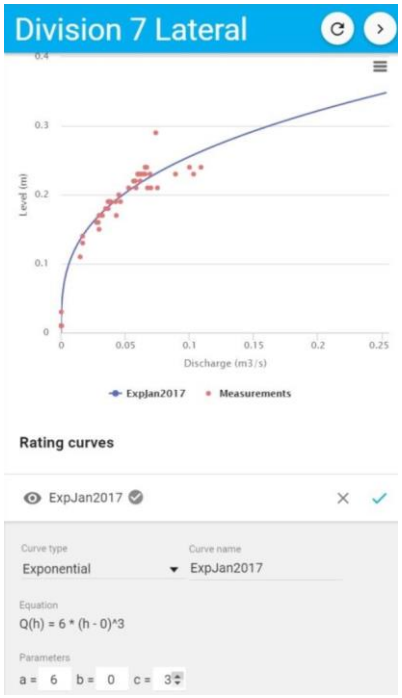

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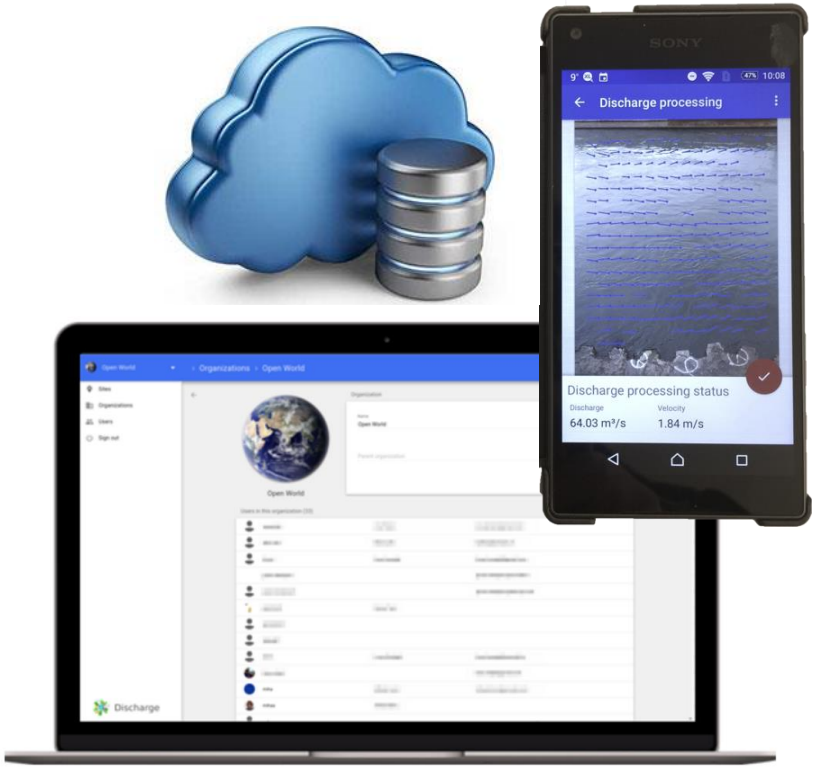

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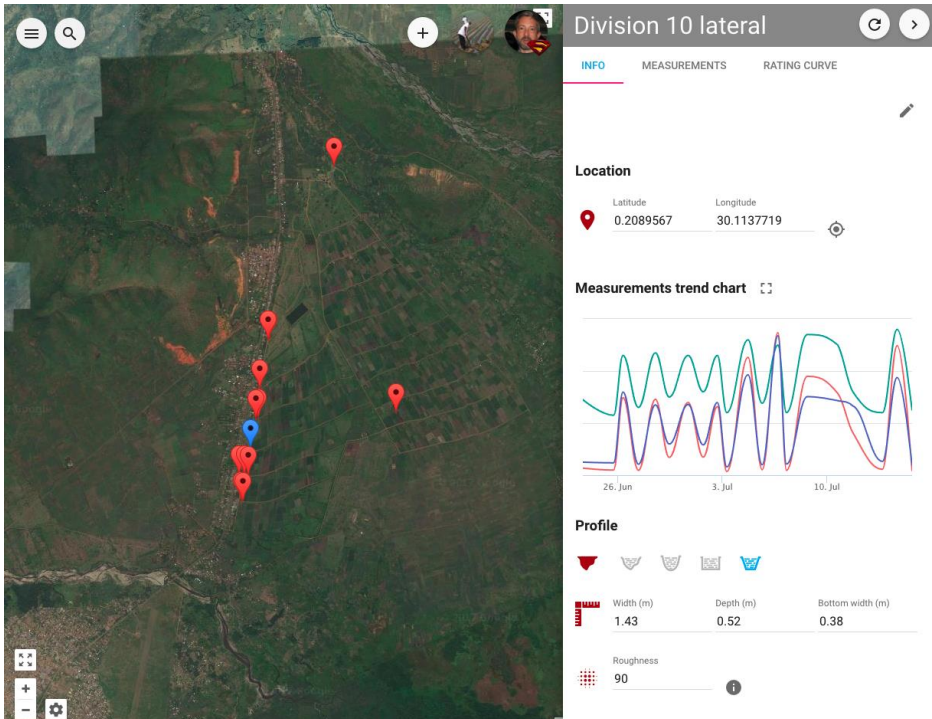

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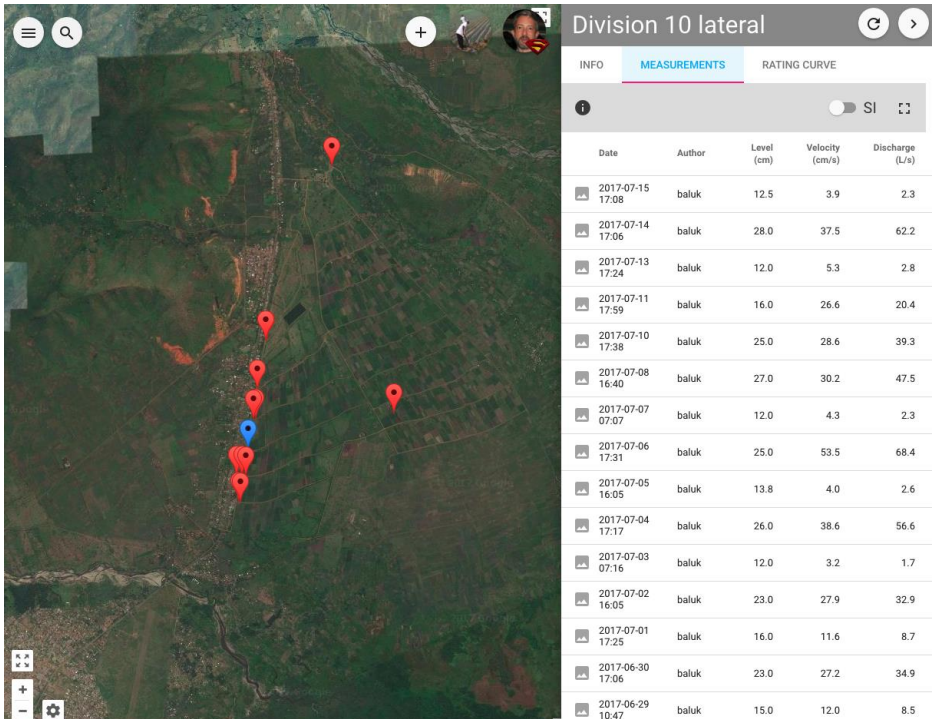

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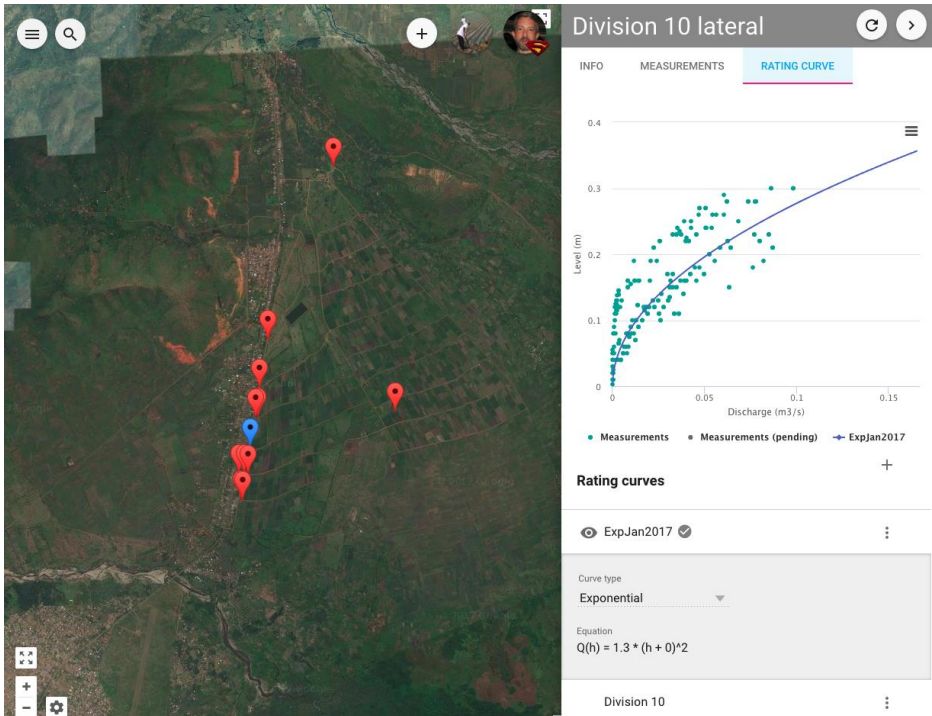
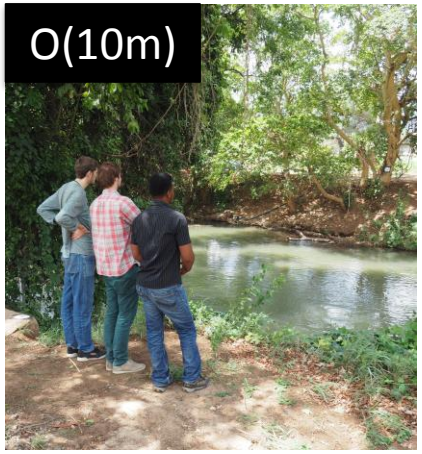


TECHNOLOGY

Application

- Irrigation canals
- Intakes
- Small to medium-sized rivers



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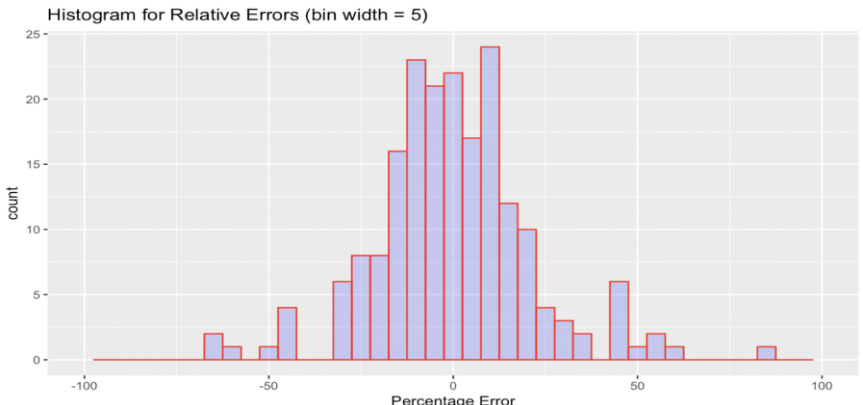
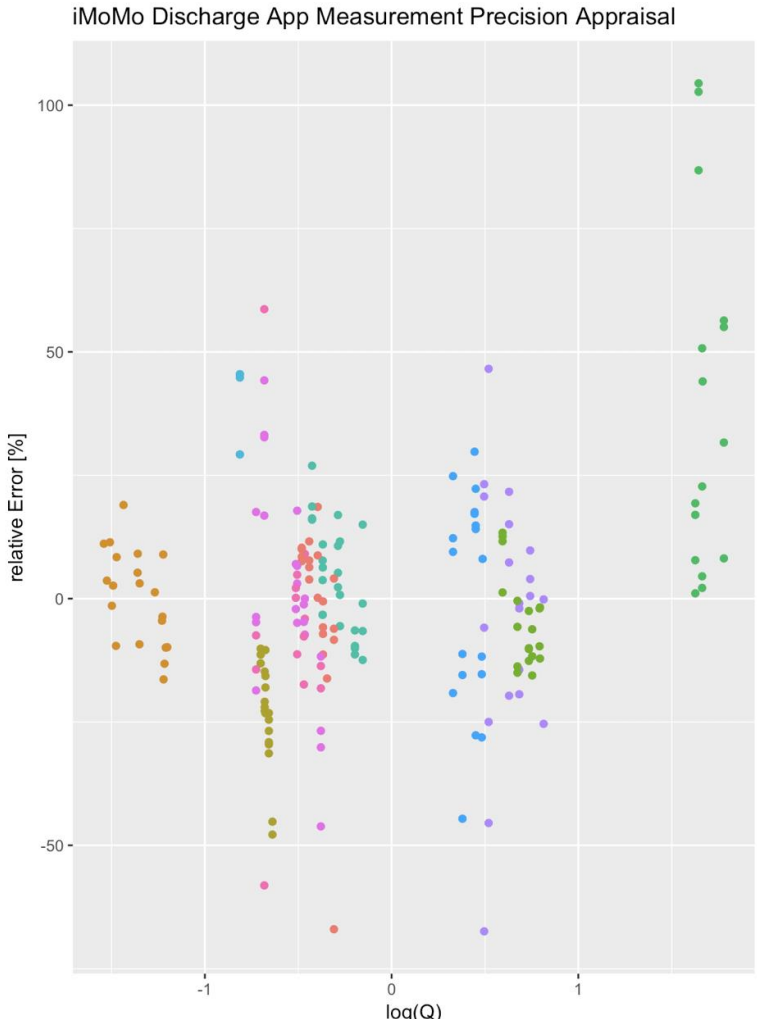
TECHNOLOGY

Measurement Precision*

- 21.3% of data within ± 5% rel. error
- 42.1% of data within ± 10% rel. error
- 75.1% of data within ± 20% rel. error

*: Campaign carried out in free profile settings
in June 2017 in South Germany jointly with SEBA





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TECHNOLOGY

Summary: Value Proposition

- Fast, non-contact, representative measurements and on-site evaluation, even by non-experts
- Scalable (1:n, n≫ 1)
- Vandalism-proofed technology
- Error-free data transmission
- Offline measurements and synchronization later possible
- Evidence-based measurements

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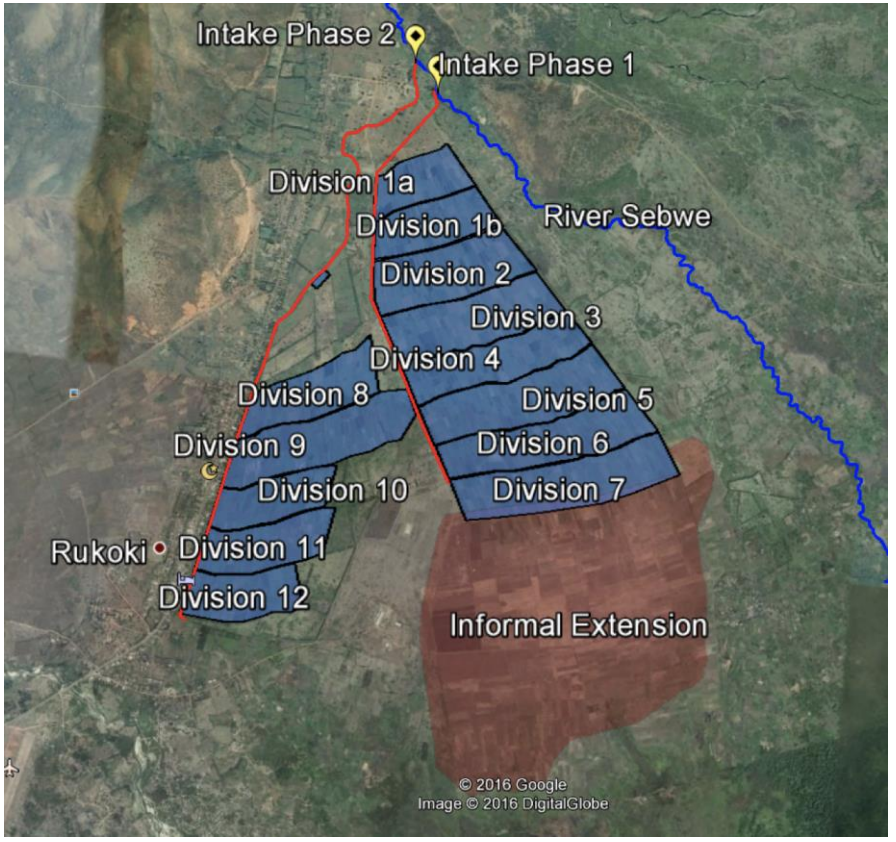
IMPLEMENTATION

Mubuku Irrigation Scheme, Kasese, Western UG

- 560 ha, 160 farmers, 13 blocks served under fixed rotation schedule.
- Several indicators of ineffective water use (over irrigation, water logging, informal scheme extension.
- Neither intake nor on-farm canal measurements due to lack of measurement technology before project start.



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IMPLEMENTATION

Activities

- Technology presentation.
- Capacity building (App, website)
- Setup of 7 pilot measurement sites in Phase 2.
- Contracting one crowd-sender (Mr. Robert Baluku, NARO) and equipping with smartphone for long-term daily measurements at agreed-upon sites and comparison measurements with discharge at weirs
- Donation of one flow meter (propeller) for various tasks.
- Scheme Mapping (canals and blocks)

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IMPLEMENTATION

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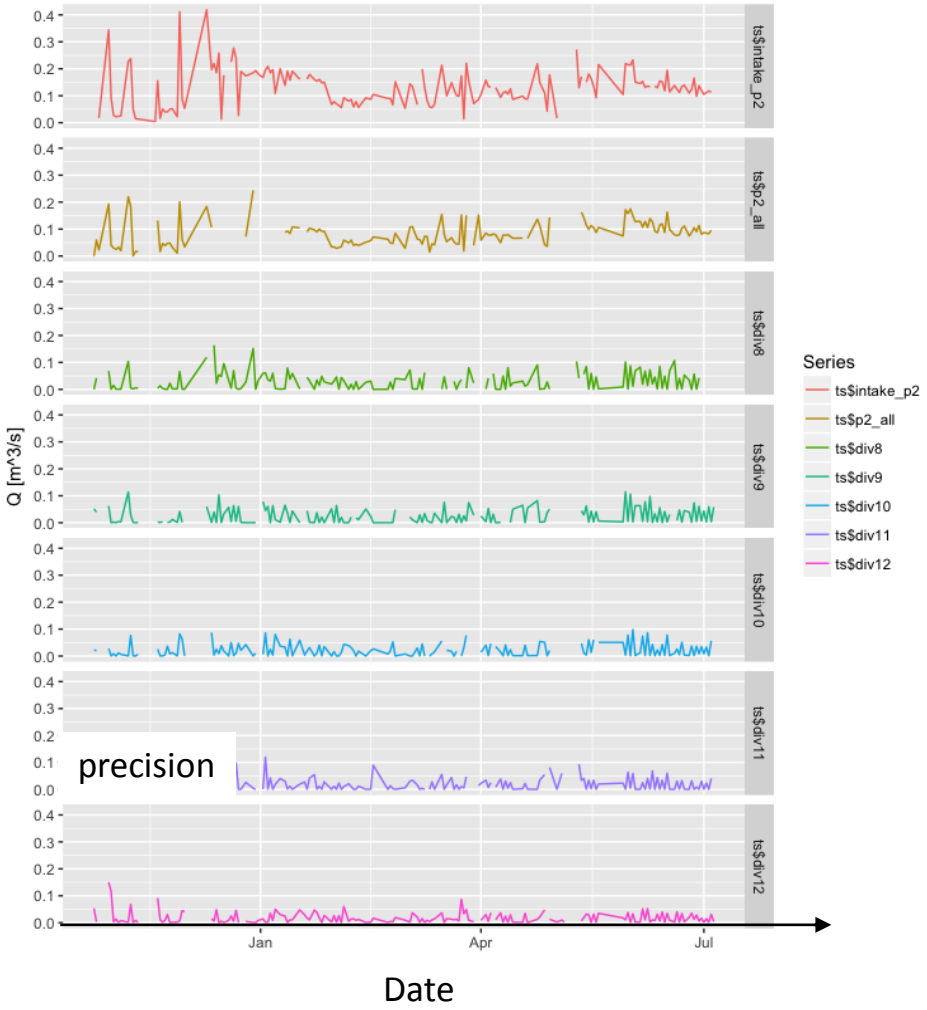
RESULTS

Data

- Regular data collected at 7 sites with App and all data stored automatically on the discharge.ch site from where it can be managed, analyzed and shared.
- Qualitative analysis of time series regime change of canal discharge



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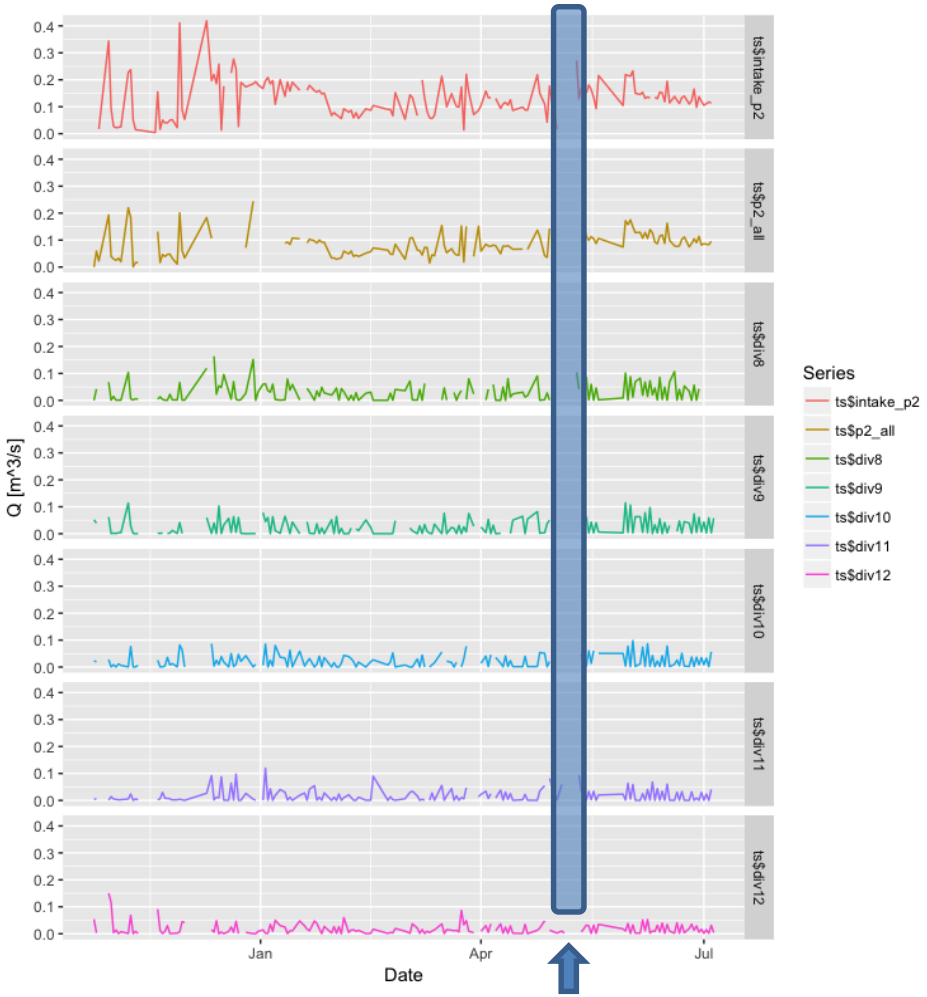

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OUTCOMES & FINDINGS

- Local stakeholders are able to fully utilize the discharge.ch platform for measuring canals, including setting up sites, data acquisition, management, sharing and analysis.
- Feedback from the field was important with regard to increasing technology robustness and usability. Hotline required in case of operational issues.
- Proper compensation and coverage of operational costs of crowd-senders is important (value their contributions).
- Local stakeholders declare interest for further outscaling.

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DISCUSSION

Considerations for Long-Term Technology Adoption

- Proper context-specific institutional anchoring.
- Human factor.
- No free lunch! Acknowledge costs for data acquisition from the beginning, even if they are low as compared to other operational costs.
- Importance of ensuring QA / QC.

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DISCUSSION

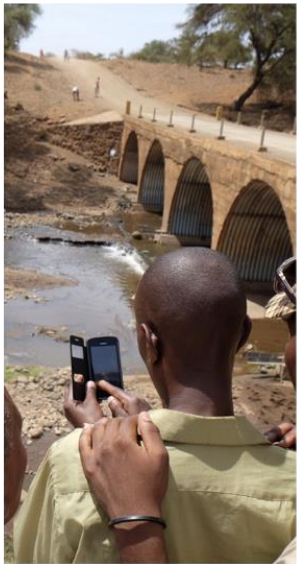
Considerations for Long-Term Technology Adoption

Community Info / Site ID / Mapping

Site Instrumentation / Calibration

Collection Protocol / Contracts & Cap. Building

Data Collection



QA / QC

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DISCUSSION

Use of Non-Traditional Data

- Scheme Management
  - Water management
  - Calculating of irrigation water requirements
  - Scheduling of water deliveries
  - Keeping records of water consumption
- Scheme Administration
  - Accounting including reporting
  - Calculating water charges (volumetric, area-based, …)
  - Performance assessment (water use efficiency, crop productivity)
  - Planning and controlling maintenance activities

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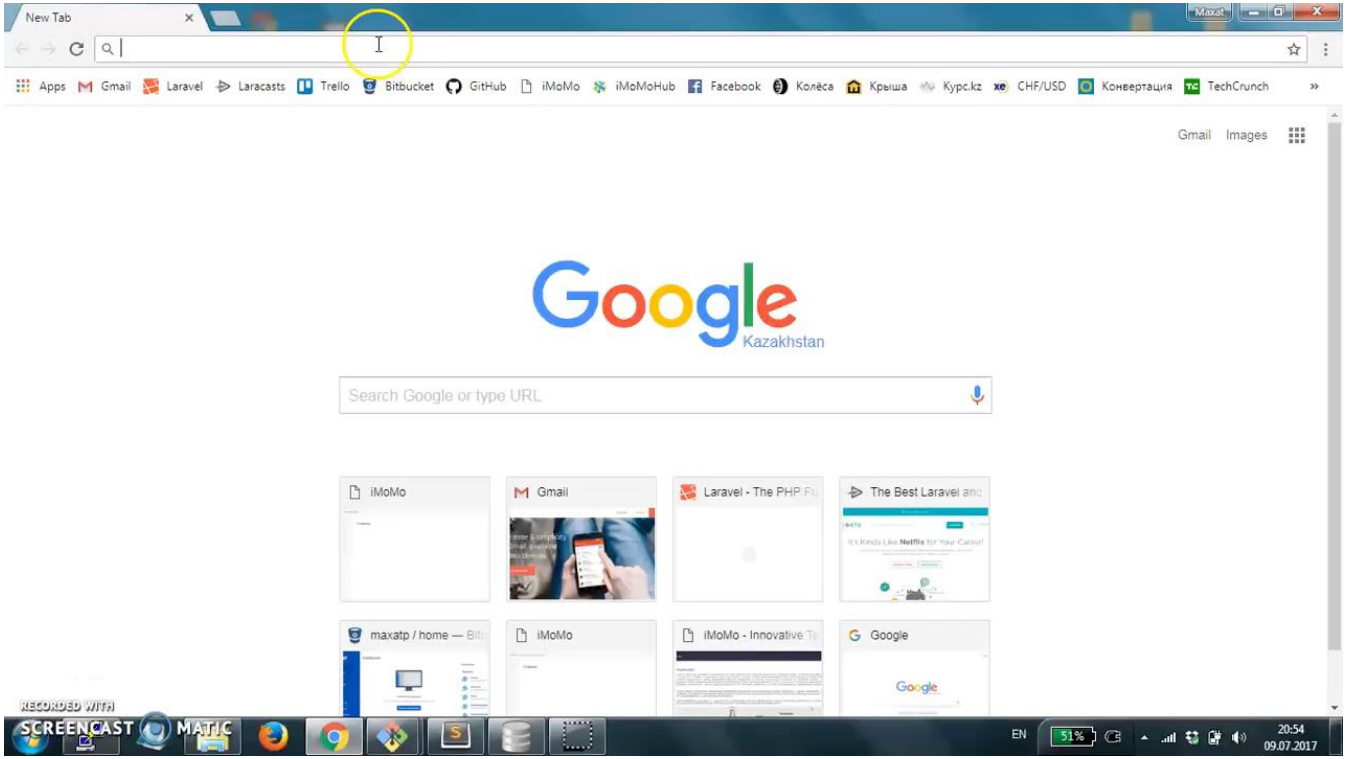
DISCUSSION

iMoMo Web-Based Scheme Irrigation Management Information System



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CONCLUSIONS

- Modern, crowd-sourced and cost-effective technologies allow to effectively monitor water in a complementary and integrated fashion
- Context-specific, robust deployment required
- discharge.ch technology platform can be used as standalone tool or as a bridge to other services (iMoMo Scheme Management Information Systems, iMoMo Hydro-meteorological Station Administration)

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SPECIAL THANKS

Special thanks go to

Mr. Robert Baluku Baleke and
Mr. Charles Mutumba

and their dedication without which all of this could have never materialized.

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SPECIAL THANKS