B-SaFFeR & AP Terra

From fieldwork in Uganda to an IoT platform for climate insights.

AP_TERRA

VUB VRIJE UNIVERSITEIT BRUSSEL

MOUNTAINS OF THE MOON UNIVERSITY

AP HOGESCHOOL ANTWERPEN

AP.BE


4+275

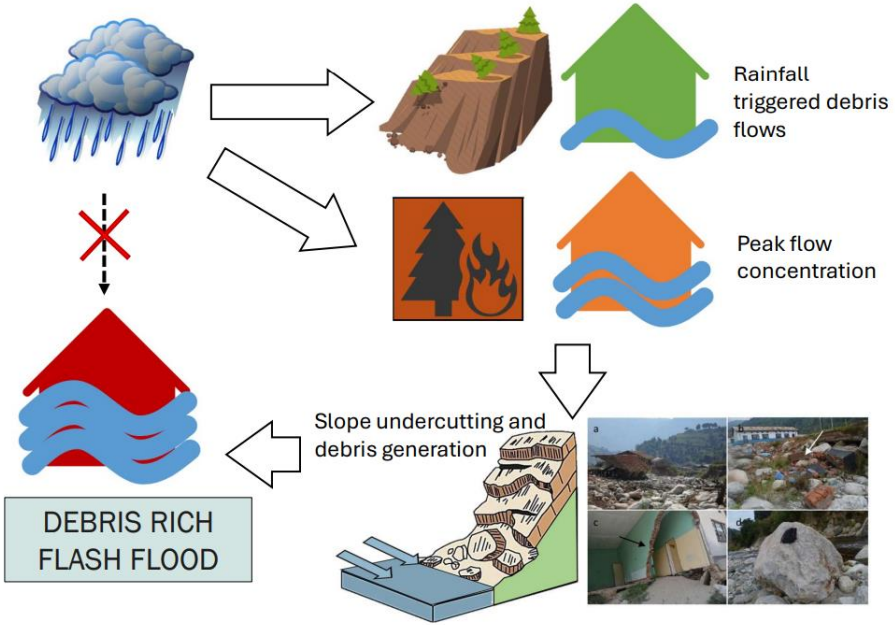

BBC
Home News Sport Business Innovation Culture Arts Travel Earth Audio Video Live
Uganda floods: At least 16 people dead, Red Cross says
8 December 2019
Share Save
DEBATING IDEAS COUNTRY CLIMATE POLITICS ECONOMY SOCIETY CULTURE SP
CLIMATE SOCIETY UGANDA
Home › African Arguments › Climate › Uganda's struggles resettling climate-displaced communities
Uganda's struggles resettling climate-displaced communities
BY DIANA TAREMWA KARAKIRE / OCTOBER 9, 2024 / 0
Landslides and flash
more likely by climate change, and
deforestati
of Uganda permanently risky to live in.
ALJAZEERA
News Middle East Explained Opinion Sport Video
Trending Israel-Iran attacks War on Gaza G7 Summit Donald Trum
News | Climate Crisis
Flooding in western Uganda kills more than a dozen
Red Cross says at least 16 bodies recovered after torrential rain causes landslides in Bundibugyo district.
The Guardian
Eur
Culture
Lifestyle
Sport
Global development
Inequality
Africa
Middle East
Australia
Asia
This article is more than 2 years old
At least 24 people dead as flash flooding hits eastern Uganda
More than 5,600 displaced and 400,000 left without clean water after heavy rain causes two rivers to burst banks
Most viewed
Live
Iranian missiles kill at
10 in Israel as IDF clain
have hit Isfahan nuclea
facility – live updates
Air India captain sent
mayday less than minu
before crash, say autho
Gathering stormclouds
wipe smile from Trump
face as long-held dream
military parade is reali
How the dismantling o
Iran's regional proxies
paved way for Israel's a
Revealed: Thousands c
university students ca
cheating using AI

Consequences of flash floods

Flash flood as a major hazard in the Rwenzori Mountains causing severe impacts

Different elements of a flash flood

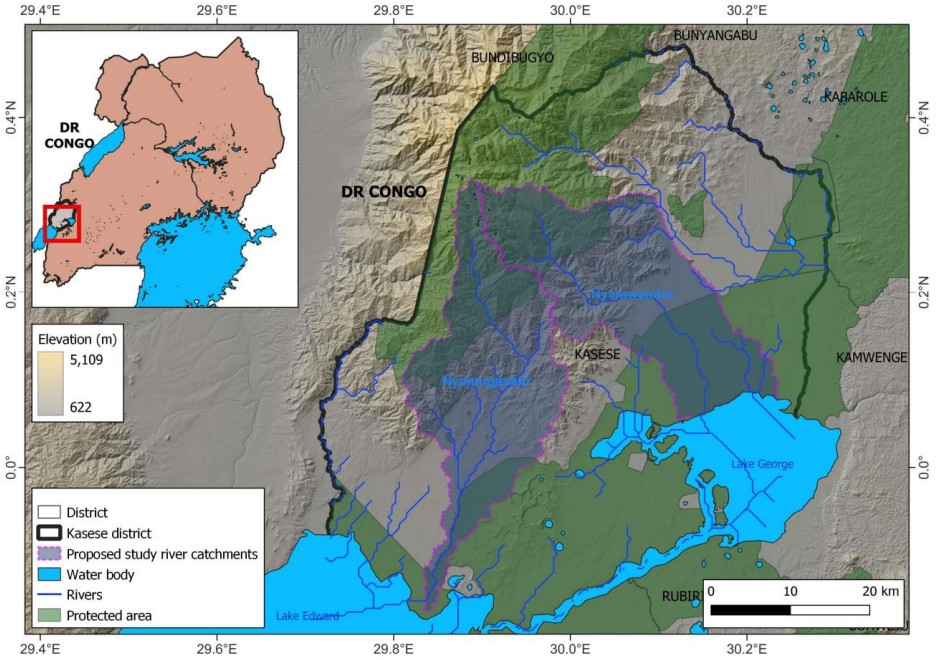
- Combination of multiple hazards
  - Rainfall
  - Landslides
  - Fires



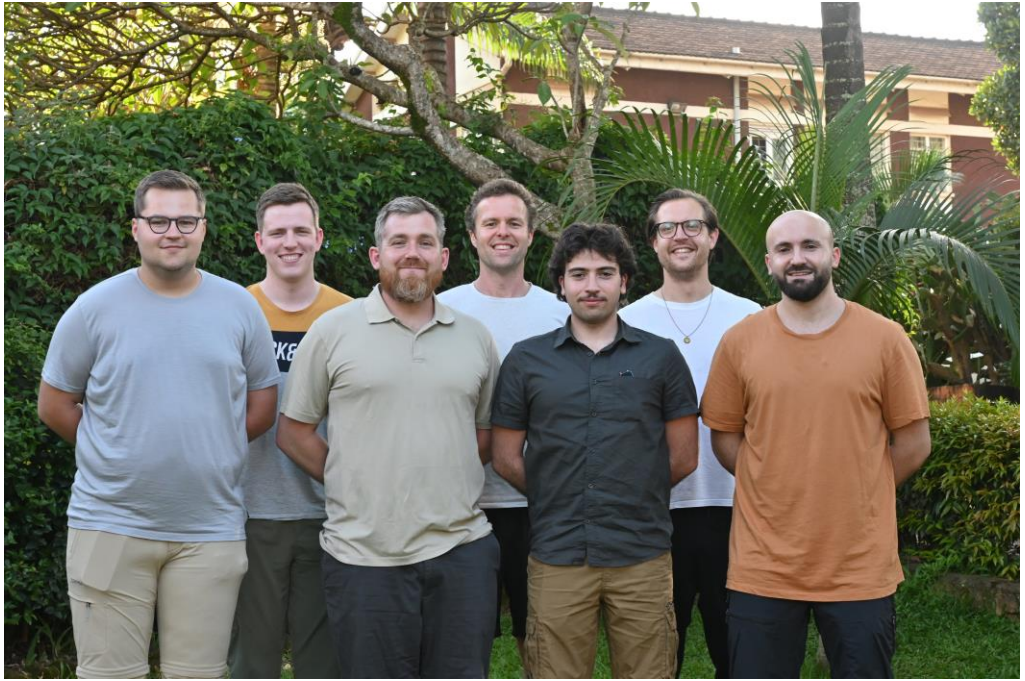
(Jacobs et al. 2016, Nat Haz)

Target Area

- 2 Catchments
  - Nyamwamba
  - Nyamagasani



The team from AP



Partners

THRIVE DEVELOPMENT FACILITY (TDF)

CBO within Nyamusagani and Nyamwamba catchments

B-SaFFeR

Building Socio-ecological resilience of communities to Flash Flooding in the Rwenzori mountains

B – SaFFeR Key Objectives

- Decrease adverse impacts of flash floods
- To understand, monitor, and warn for flash flood
- Local knowledge and codesign effective preparedness actions and solidarity mechanisms.
- **Demonstrate the added value of low-cost river and rainfall monitoring system adapted to the local context**

Monitoring the situation

- Situation as is
  Everything is done manually

- Situation to be
  Automate everything

Everything is done manually

- Manually **gathering sensor data from 10 monitoring stations** across Uganda.
- Powered by **batteries only.**
- No indication when a **sensor goes offline**.
- **Data loss.**
- **No live data**, unable to do any live estimations from historic data.
- **Costly operation** to retrieve data from all monitoring stations. (A person needs to be hired to retrieve the data)

The role of AP

- Automatic sensor data collection
- Alert when system goes down
- Live dashboard
- Data retention
- Solar powered
- Reduced operational cost

ROB - WIM - POL

VRIJE UNIVERSITEIT BRUSSEL

MOUNTAINS OF THE MOON UNIVERSITY

AP HOGESCHOOL ANTWERPEN

AP.BE

Who is who

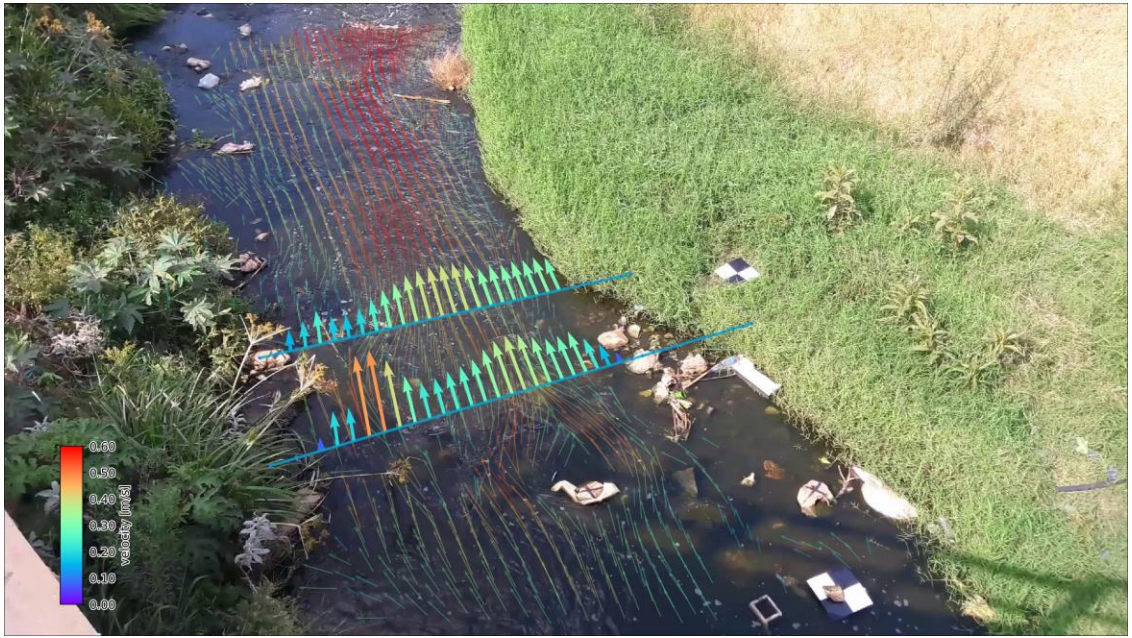
Let's meet ROB
(River Observation Basestation)

ROB

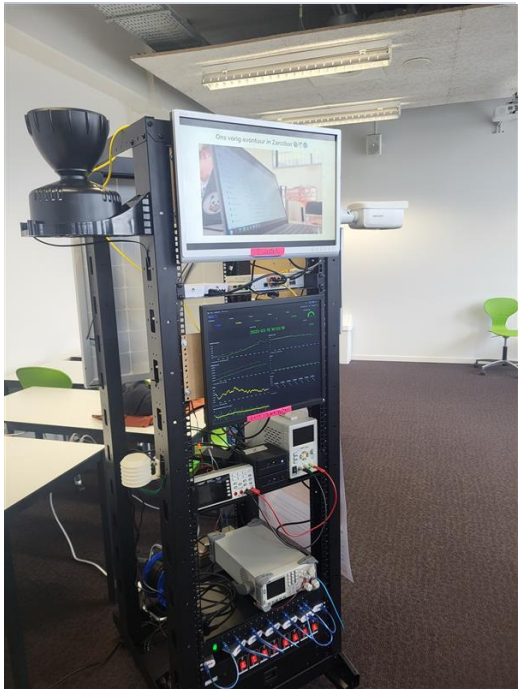
- Camera observation
- Solar panel + large battery
- LTE Router & antenna
- Weatherproof enclosure

Flow

Camera → Raspberry Pi → LTE Router → AP-Terra

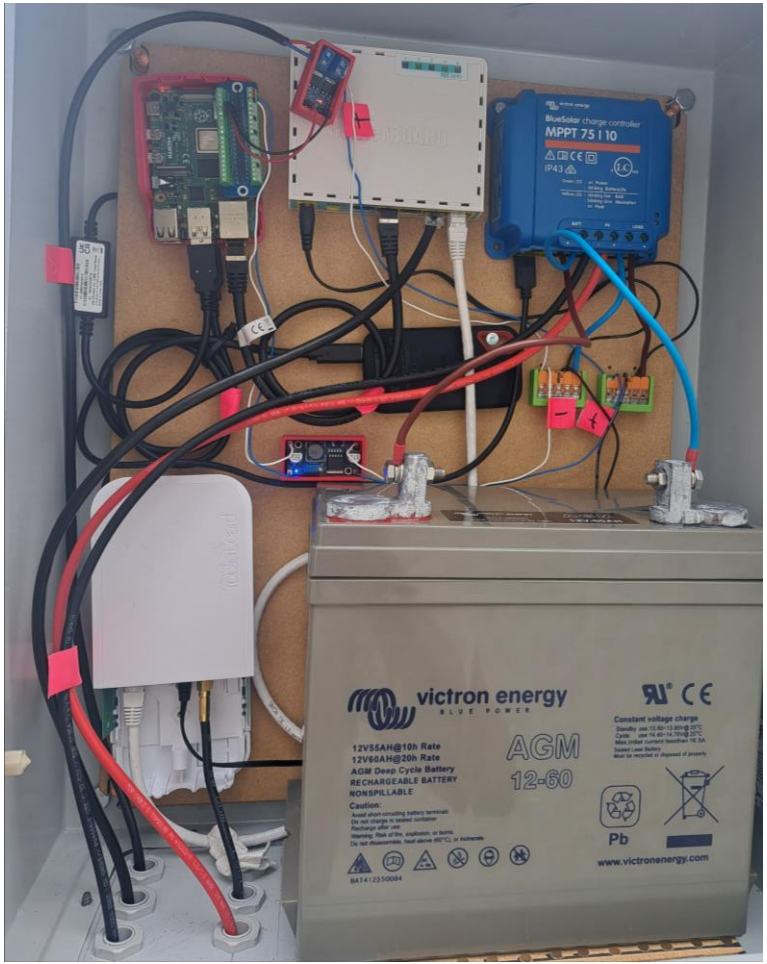


ROB in Belgium



Components – ROB in Belgium

- Solar charge controller
- Battery
- Raspberry Pi
- Router
- Switch
- Storage
- MOSFET switch



ROB in Kilembe

Components – ROB in Uganda

Added:

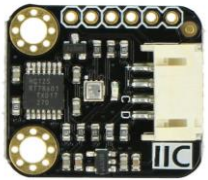
- Fan
- 4 Gore Vents
- Temperature and Humidity sensor (DHT11)

Now it's up to WIM

WIM (Weather station Integration Module)

WIM (Weather station Integration Module)

DFRobot SHT31:
- Temperature
- Humidity



DFRobot BME280:
- Temperature (inside)
- Humidity (inside)
- Pressure (inside)

Davis 6466M Tipping Bucket:
- Rainfall
- 0.2mm rain per tip
- Sends pulses

POL

POL (Publisher of levels)

- Off the shelf level gauge from Obscape (radar)
- Placed on request of VUB
- Adapter for AP Terra
- Measures
  - Water depth
  - Water level
  - Humidity
  - Pressure
  - …

Fieldwork in Uganda

VRIJE UNIVERSITEIT BRUSSEL

MOUNTAINS OF THE MOON UNIVERSITY

AP HOGESCHOOL ANTWERPEN

AP.BE

5 weeks in the field

Improvise. Adapt. Overcome.

- Climate
- Logistic challenges
- Connectivity
- Cultural aspects
- Field visits

Collaboration with local partners

AP Terra

VRIJE UNIVERSITEIT BRUSSEL

MOUNTAINS OF THE MOON UNIVERSITY

AP HOGESCHOOL ANTWERPEN

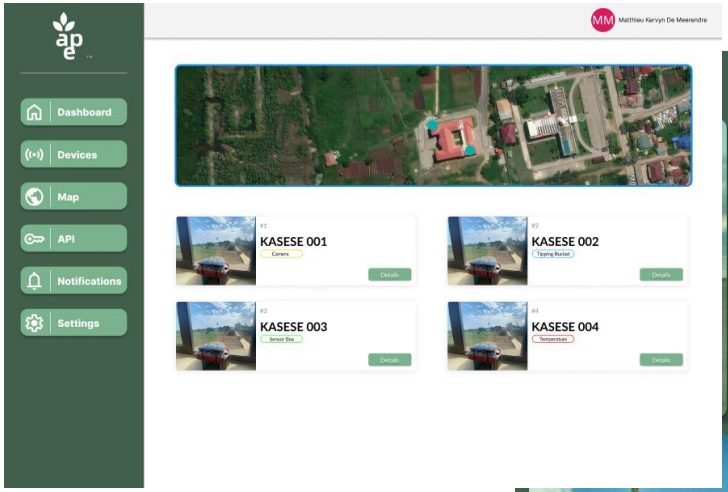
AP.BE

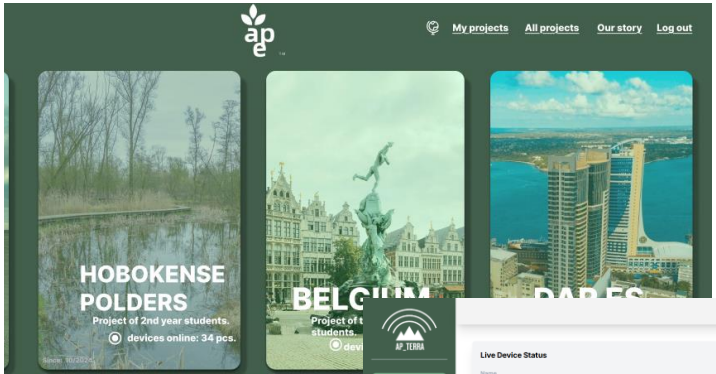

AP_TERRA
B_SAFFER '25

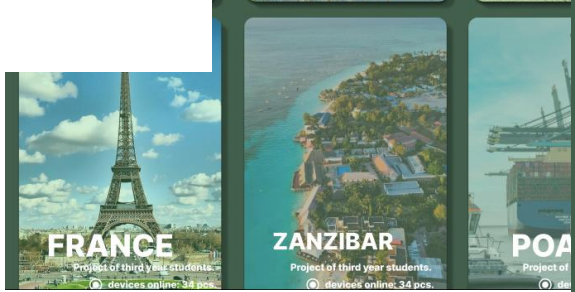
AP Terra

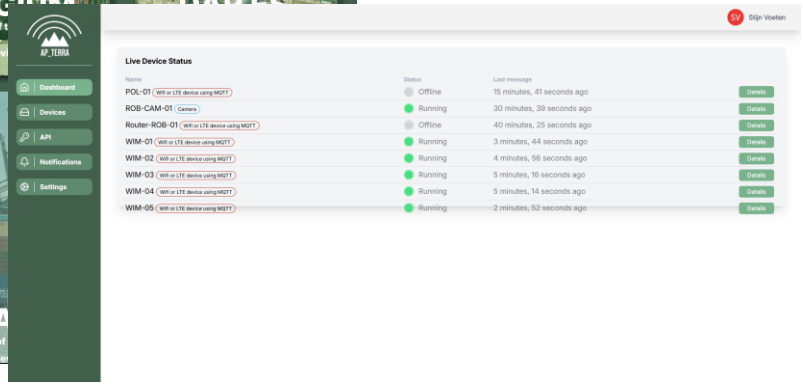
A uniform and universal IoT device project management platform called 'AP Terra'.

AP Terra


Dashboard
Devices
Map
API
Notifications
Settings
KASESE 001
KASESE 002
KASESE 003
KASESE 004

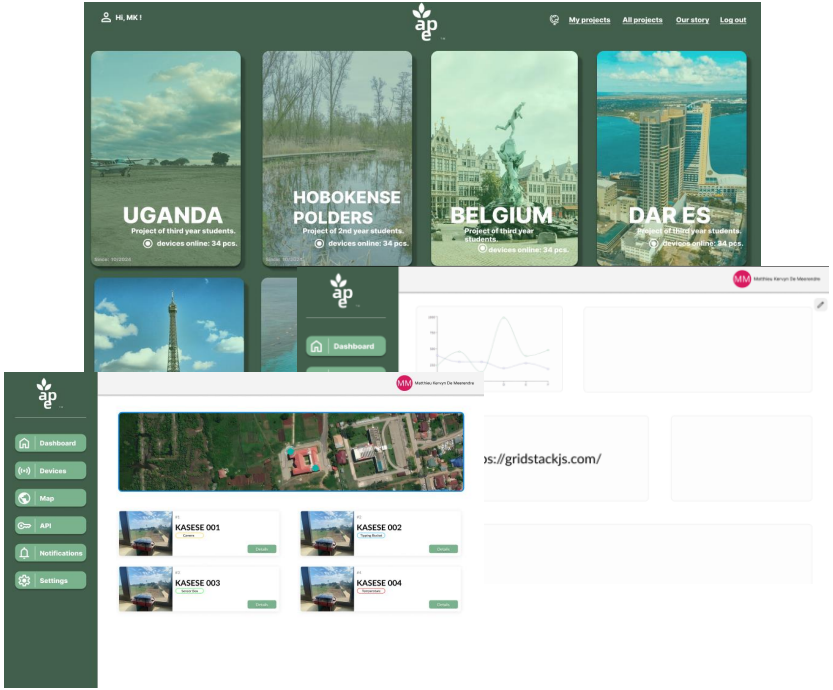

My projects
All projects
Our story
Log out
HOBOKENSE POLDERS
Project of 2nd year students.
devices online: 34 pcs.


FRANCE
Project of third year students.
devices online: 34 pcs.
ZANZIBAR
Project of third year students.
devices online: 34 pcs.


AP_TERRA
Dashboard
Devices
API
Notifications
Settings
Live Device Status

What is AP Terra

- Turnkey solution for
  - Data collection
  - Device management
  - Project administration



AP Terra's – key features

1. **Global Project Management and Visualization**:
   Central platform to manage and visualize projects worldwide.

2. **Seamless Device and Sensor Integration**:
   Low/no-code tools to connect and monitor IoT devices via clear dashboards.

3. **User-Friendly Onboarding and Control**:
   Step-by-step setup and easy management of notifications, users, and API keys

Demo

AP Terra

https://apterra.be/

The Provincial Prize for Global Research 2025

AP Terra Future

- ROB
  - computer vision integration, server side or edge
- WIM-2
  - robust, include wind, place extra for Flash Floods & agriculture
  - Collaboration with local workfield
- AP Terra
  - Biogas measurement in Dar es Salaam, WIM-2 in Uganda, water quality in Mombasa and Belgium, Beacon lights in PoAB
- …

Questions?

Maarten Luyts
IoT Project Coordinator

AP | Campus Ellerman
Science & Technology
Ellermanstraat 33

2060 Antwerpen

Belgium

Gsm + 32 495 650 346

maarten.luyts@ap.be

Dirk Van Merode
International Project Coordinator

AP | Campus Ellerman
Science & Technology
Ellermanstraat 33

2060 Antwerpen

Belgium

Gsm + 32 496 268 415

dirk.vanmerode@ap.be

Let’s continue building on this success.

AP HOGESCHOOL ANTWERPEN

AP.BE