Using mapping and drones for sustainable operations in health and environment

Case studies from Malawi
Today’s topics

1. Presentation of Crowddroning
2. Fighting malaria with maps in Malawi
3. Mapping the flooding risk with high-resolution drone maps
Crowddroning

Solution for global high-quality data acquisition with drones
Crowddroning

A global network of 5000+ local drone pilots in 90+ countries

Rapid upscale and sustainable acquisition of drone data
Drones for health

Fighting malaria with maps in Malawi
Malaria: a global problem

200+ MM
Affected per year

400+ К
Death per year
Malawi: malaria situation

4 million People diagnosed every year

15 top Country hit by malaria worldwide
Vector control as a solution
Vector control an alternative way to fight malaria

Mosquitoes flying in swarms are difficult to eradicate.

Modify the environment where mosquitoes breed as a tool to limit their population and decrease malaria.
Local drone pilots went mapping
Mapping breeding sites step-by-step

Step 1:
Plan the mission
Mapping breeding sites step-by-step

**Step 1:**
Plan the mission

**Step 2:**
Capture data with a drone
Mapping breeding sites step-by-step

**Step 1:**
Plan the mission

**Step 2:**
Capture data

**Step 3:**
Process the data into an orthomosaic map
What is an orthomosaic map?

High resolution image consisting of all captured drone images

Spatial resolution that can be reached: 0.5 cm
Locating breeding sites with drones
How does a malaria breeding sites look like?

Characteristics

- Swamp
- Shallow water
- Still water
- A lot of vegetation
Manual mapping

Cons

Time consuming
Prone to errors
Challenging to undertake for large areas
AI model automatically map breeding environments

From Stanton et al. 2020
Final product: GIS map with mosquito breeding sites info

Accurate location of the breeding sites

Size of the area for intervention
Scale up potential

*Unlimited scale up opportunities*

*Billions of dollars* to be saved

*Better life* for people in Africa
Drones against climate change

Model the risk of climate-related flooding in Kasungu, Malawi
Malawi: a snapshot

85% Of population living in rural areas

80% Of population engaged in subsistence farming
Rusa River flooding

Satellite image
pre 2020 dry season

Drone image
2020 wet season
What will be the impact on the local community?
Can we know how severe is the yearly flooding?

Investigation with satellite imagery to get historic data that is difficult to get with drones.

Used Google Earth Engine to see the early river level change.
Yearly flood mapping through satellites

Open-source algorithm used to process satellite imagery

Only rainy season analysed: **January to March**

False colour temporal composite images for the same timespan

River started to be wider after 2017
Flood risk modelling with high-resolution drone data
Yearly flood mapping through satellites

**Step 1:**
Capture data with a drone
Yearly flood mapping through satellites

**Step 1:**
Capture data with a drone

**Step 2:**
Process data into an orthomosaic
Yearly flood mapping through satellites

**Step 1:**
Capture data with a drone

**Step 2:**
Process data into an orthomosaic

**Step 3:**
Extract elevation data from orthomosaics
Yearly flood mapping through satellites

**Step 1:**
Capture data with a drone

**Step 2:**
Process data into an orthomosaic

**Step 3:**
Extract elevation data orthomosaics

**Step 4:**
Export contour lines to a GIS software for analysis
Yearly flood mapping through satellites

**Final step:**
Investigate how floods can affect the local community
Final model products

35 hectares
Of agricultural land will be lost with any further river level rise

5m
Of river level rise, the water will reach the village
Impact and scale up

**Implications**

- Prevention
- Search and rescue
- Insurance
- Construction
Check out our story maps

**Malaria**
https://storymaps.arcgis.com/stories/ea7ebc6b6f4148a7892db06e13a87e3d

**Forestry**
https://storymaps.arcgis.com/stories/91c4264640254cb79c5650433bb97747
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