Drone & Mobile technologies for complementary malaria vector control

An operational research study by the PMI VectorLink Project in collaboration with the National Malaria Control Program of Madagascar

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Background

- **PMI VectorLink** in collaboration with the **National Malaria Control Program** conducted an operational research study to evaluate larval source management (LSM) as a complementary vector control approach to **reduce mosquito density** in rice fields of Madagascar and therefore lessen the burden of malaria in rural communities.
- This activity sought to **reach populations** often excluded from traditional vector management approaches.
- In partnership with Aerial Metrics, the project assessed the **feasibility and effectiveness of drone technology** as a method for delivering larvicide to rice fields in targeted areas.
- **Geospatial mapping and mobile data collection** approaches informed **real-time decision making** in a **cost sensitive** way.

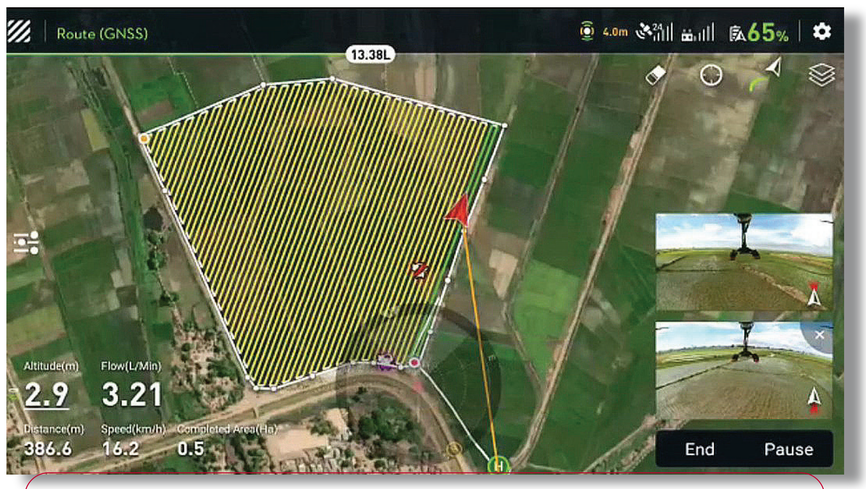
Methods

- Aerial Metric used **2 drones equipped with high resolution cameras** to map 20,000 hectares of rice fields to inform intervention targeting decisions. The project included approximately 900 hectares in the operational research study.
- **Geospatial and altitude coordinates guided logistical plans**, including optimal flight paths for larvicide delivery and guided carrier drones to fly automatically with minimal involvement from the pilots.
- **6 carrier drones** were used to apply bi-weekly treatment of *Bti*, a bacterial larvicide that **kills mosquito larvae** before they reach maturity.
- PMI VectorLink trained 12 drone pilots on **mobile data collection**. Pilots used ***ODK Collect***, an open-source mobile app, to **capture data offline** and report on a **dashboard**.

Findings

- **Drones dispersed** a total of 2,316kgs of *Bti* biweekly over the span of **5 months** (February 22 – July 22, 2022).
- Early entomological data results show **net reduction in the larval density** in the rice fields compared to baseline.
- **Mobile data collection** was essential for **adapting** daily drone flight patterns due to weather, manage inventory, supervise performance and deploy resources efficiently.

Refilling of carrier drone tank with larvicide mixture.



GIS map with predetermined flight paths, built-in sensors (including cameras) to monitor altitude, speed and flow rate data.

DJI Agras T30 drone equipped with 8 nozzles delivering *Bti* to rice fields:

- Spray tank capacity: 30 liters
- Altitude: 3 meters
- Application rate: 300g/ha
- Air speed: 15 kph
- Flow rate: 1.5 liters/min

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