Technical innovations in Global Desert Locust Early Warning
Desert Locust
Fall Armyworm
Caucasus & Central Asia locusts
Red Palm Weevil

major transboundary pests
Early warning systems

75 years in progress

- Desert Locust (since 1943)
- Caucasus & Central Asia (since 2010)

emerging

- Red Palm Weevil (2017)
- Fall Armyworm (2017)
a swarm of Desert Locust
a swarm the size of **Vienna**
eats the same amount of food in **1 day**
as everyone in **Austria + Switzerland**
Desert Locust
Schistocerca gregaria

50 countries

20% of the Earth’s land surface
irregular recessions & plagues
(1860–2017)
$570\text{ MILLION} \quad \text{CONTROL OPERATIONS (2003–2005)}$

$3.3\text{ MILLION} \quad \text{ANNUAL COST PREVENTIVE CONTROL (10 COUNTRIES W+NW AFRICA)}$

$3 = 170$

\begin{align*}
\text{YEARS} & \quad \text{YEARS} \\
\text{CURATIVE} & \quad \text{PREVENTIVE}
\end{align*}
climate change impacts

- temperature increase
- rainfall unusual events
- winds shifting

★ more rapid maturation
★ more frequent outbreaks
★ new invasion areas

more Desert Locusts!
1. collect
2. analyse
3. advise

information flow
FOR AREA-WIDE PEST MANAGEMENT
Desert Locust early warning system

1. Data collection
2. SWARMS geographic information system
3. MODIS-DERIVED MAPS
4. SEASONAL PREDICTIONS
5. RAINFALL ESTIMATES
6. Advice (outputs)
Innovations

**eLocust3**
- handheld data logger
- data transmission by satellite
- navigate to vegetation without Internet

**Dynamic greenness**
- MODIS-derived
- on-demand delivery by GEE
- new: dryness & soil moisture

**GIS analysis**
- open-source
- use team communications to provide training & support
SUCCESSFUL
area-wide pest management

✓ meet & adapt to users’ needs
✓ keep it simple but powerful
✓ issue clear & well-targeted outputs
✓ provide sufficient training & support
✓ give feedback & motivation
✓ develop partnerships & networks
✓ always innovate sensibly
always innovate . . .

transport

computing

telecommunications

remote sensing

data management
1 ID by satellite
2 100km survey
3 site inspection
4 safe control

DRONES
LONG-DISTANCE DRONE to find green areas within vast desert
ADDITIONAL EXTENSIVE SURVEYS from field base camp

50-100 km
intensive site inspection

ROTARY DRONE surveys site for locust infestations
CONTROL DRONE sprays locust infestations
• **Learn from world’s oldest** migratory pest early warning system

• **Appropriate innovation** can lead to success

• **Adapt & apply** to other area-wide pest management
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