Mobilizing mass action through mobile devices:

Challenges and opportunities for science, policy and governance

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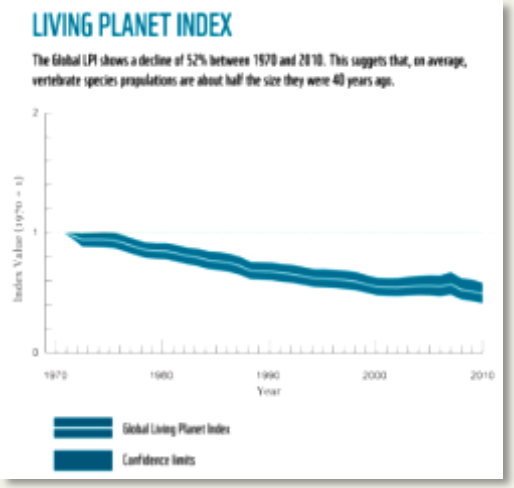
Outline

1. Global challenges and opportunities
2. Theory and practice of citizen science
3. Finding solutions within a new epistemology

Our Challenges

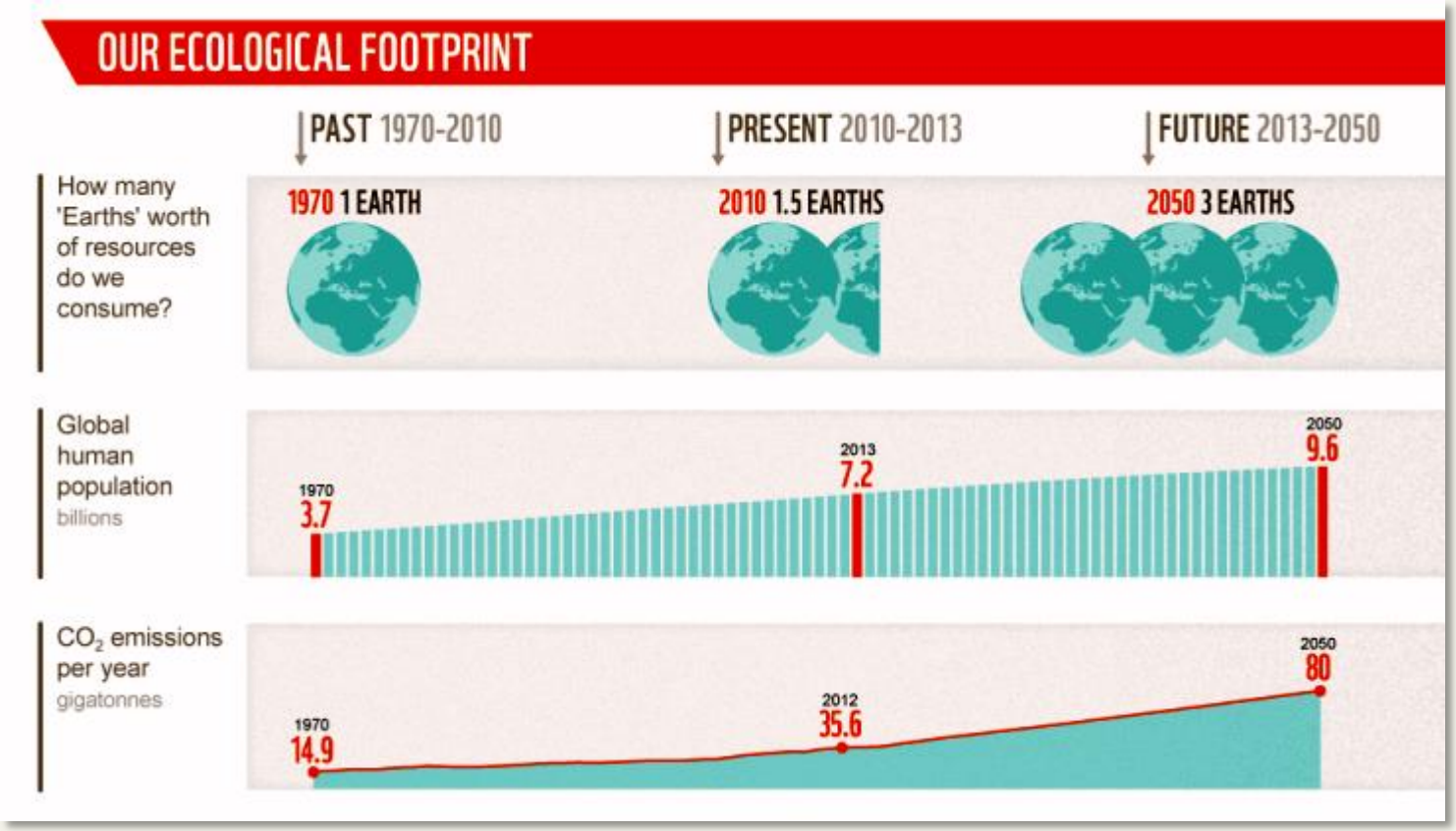
Consuming beyond our means



Biodiversity loss

Climate change

Living as if we owned an extra planet or two



We need to produce more with less

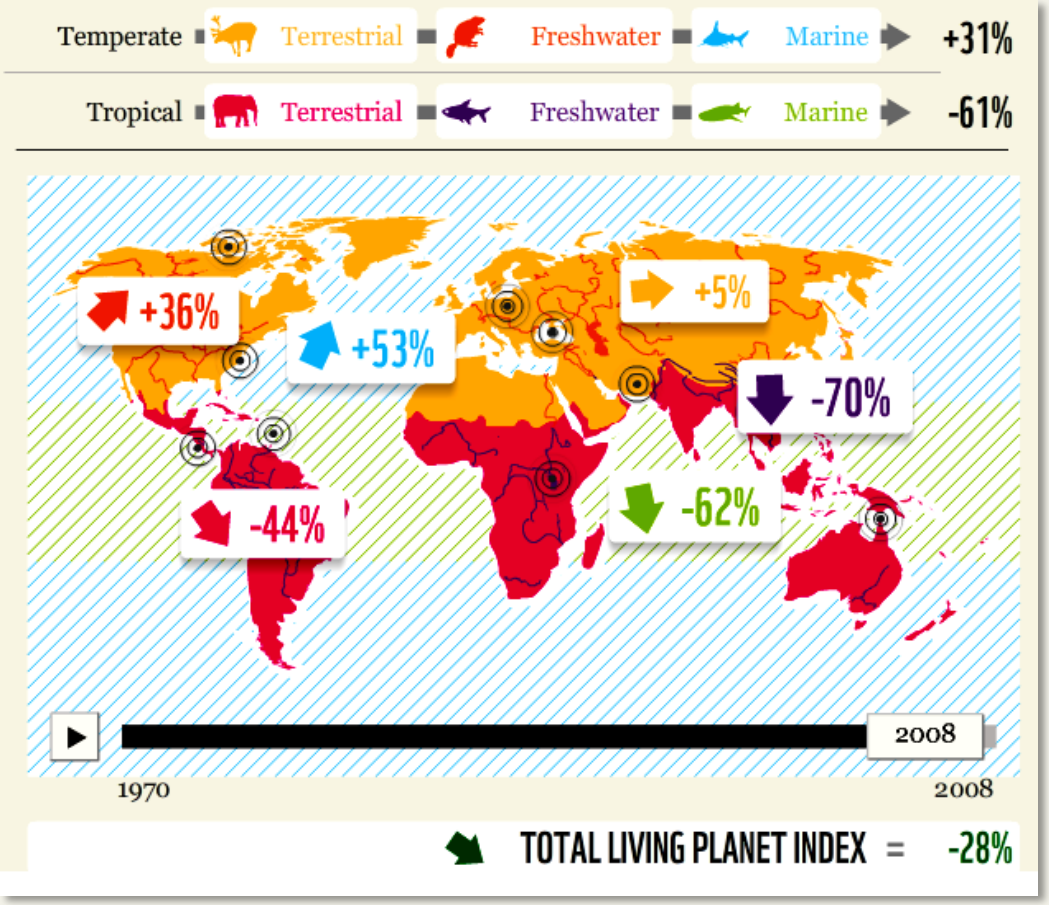
By 2050 ...

70% more food production will be needed

While climate change dries river basins and increases the pressure on crop yields.

3.5 billion people in water-stressed river basins by 2025

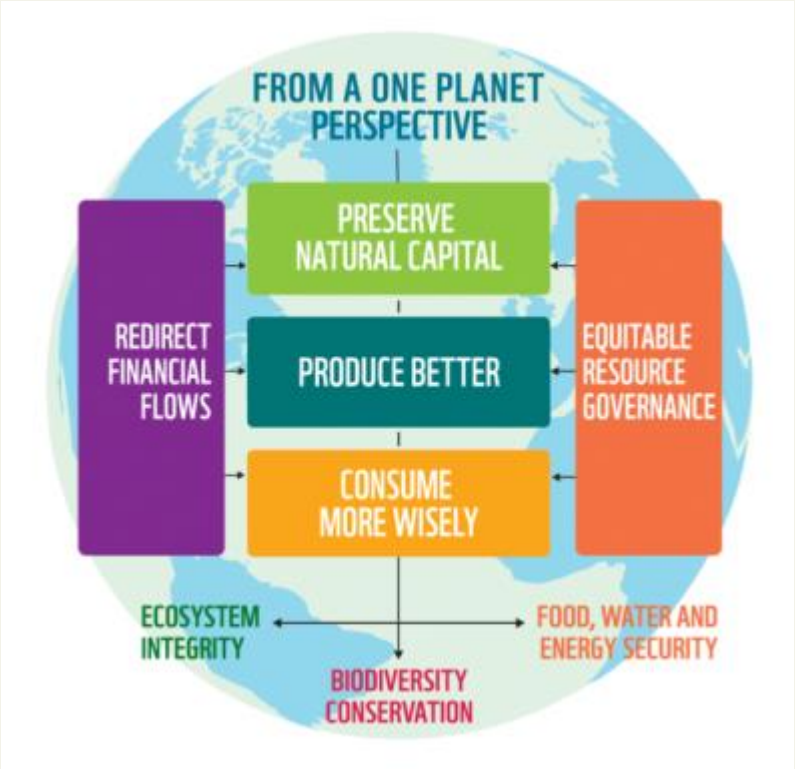
Half of all higher animal species lost since 1970s



Annamite subspecies of the Javan Rhino

To address these probems we need …

a systems approach …



at scale

To meet the urgency of the modern environmental challenge, we need solutions that can deliver at scales of at least:

1

million

- hectares of habitat protected
- tonnes commodities certified as sustainable
- tCO2e emissions reduced
- people informed and active

$ billion

financial flow influenced

We have some solutions

Amazon Region Protected Area Program, Brazil

Results: 52 M ha, 1.2 B CO2e ↓, $80 M finance

Mai Ndombe Emission Reduction Program, DRC

Planned Results: 13 M ha, 29 M CO2e ↓, $176 M

Certification Schemes (FSC, RSPO etc)

Results (FSC): 183 M ha of forest certified

Danube River Basin Commission

Results: A cleaner, swimable river

And there is no shortage of money

New financing for climate and sustainable development

Public climate finance (REDD+ / Adaptation, Land degradation neutrality)

$7-9 billion allocated since 2007.

$20-30 billion potential from Paris outcome 2015

Private finance (e.g. Green Bonds, banking standards, ESG)

$37 billion in green bond issuances in 2014 and accelerating

Impact investing / entrepreneurs

$11 billion estimated value in 2014

Impact entrepreneurialism has the potential to produce local solutions faster and more sustainably.

But where is technology among these solutions?

WWF

60 EARTH HOUR

What if we could harness the energy of a billion people for the whole year rather than just an hour?

Can mobile technology help transform how we live on this planet?

Citizen science is growing exponentially

citizen cyberscience centre

Citizen Scientists League

citizen cyberLab

project noah

ACT Centenary BioBlitz

Galaxy Zoo

Audubon Christmas Bird Count

iSpot your place to share nature

ExCiteS

Jay Watch A Citizen-Science Program

Frog Watch USA

Citizen Science Alliance

eye on earth

Zooniverse Real Science Online

d.e.w. Digital Earth Watch

socientize citizen science projects

Reef Check Worldwide

Dolphin Watch Junior

Cobweb Citizen Observatory Web

GEO-Wiki

eBird

European Citizen Science Association

science for citizens .net

Citizen Science OPT Foundation

foldit Solve Puzzles for Science

Mobile phones are a truly disruptive technology

What is the potential when we combine citizen science and mobile tech?

Global Problems: Air Pollution

Solution: iSPEX

iSPEX – simple attachment to iPhones to measure aerosol optical thickness (size, concentration)

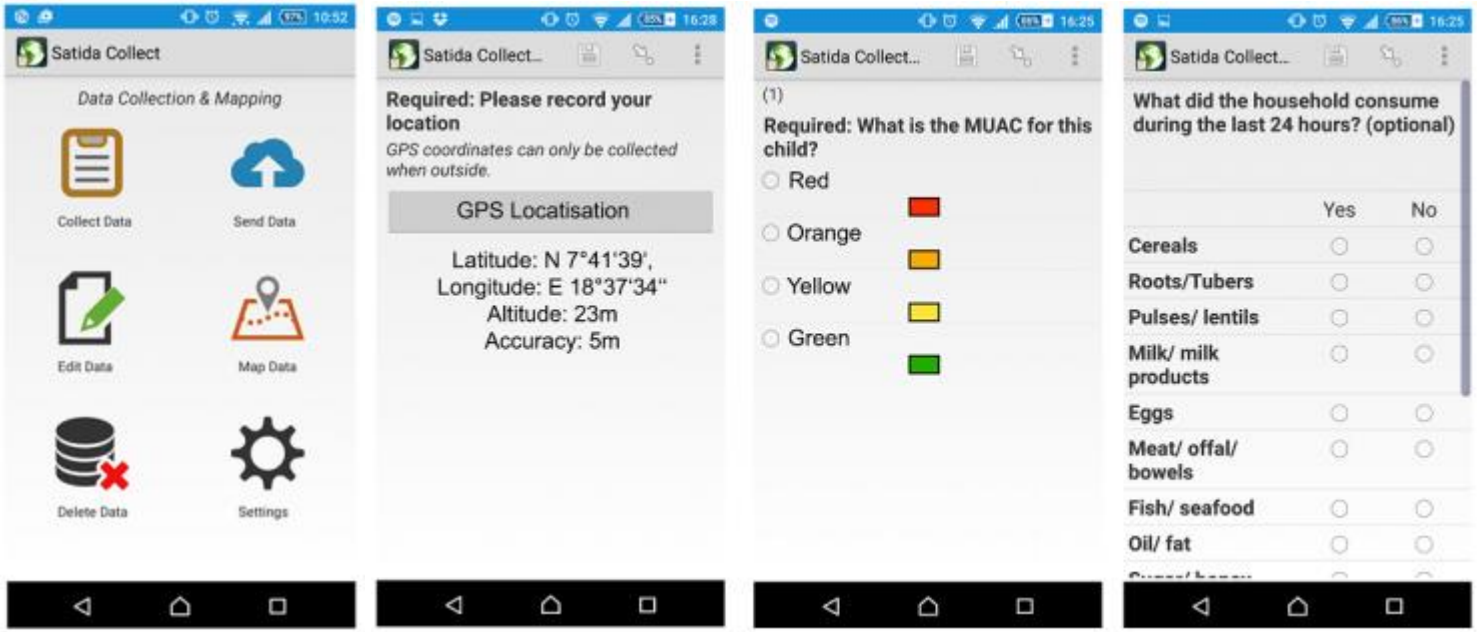
Global Problem: Natural Disasters

Solution: MicroMappers

MicroMappers UAV tablet app – for rapid identification of areas of damage

Global Problems: Food Insecurity and Malnutrition (Vulnerability)

Solution: Satida Collect GeoODK



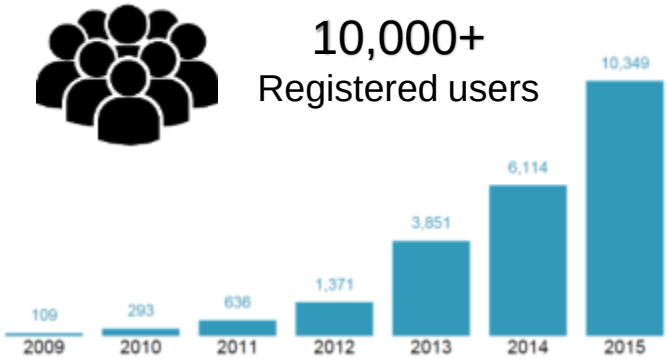
Satida Collect – app to gather household data on the ground and visualize drought info

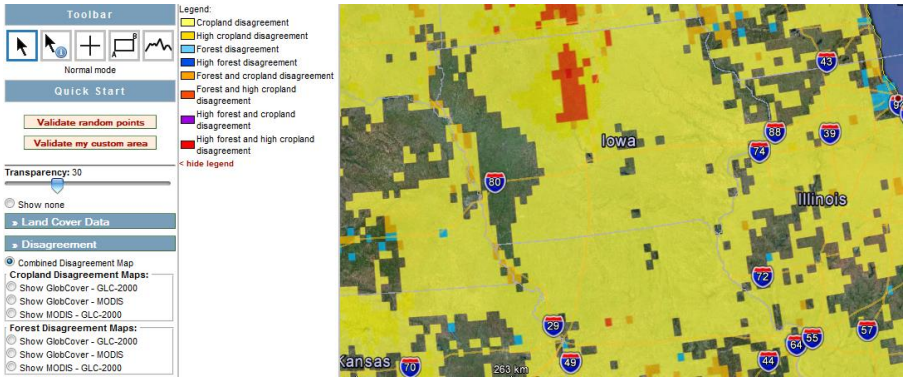
Enenkel, M., See, L., Karner, M., Alvarez, M., Rogenhofer, E., Baraldes, C., Lanusse, C. and Salse, N. In press. Food security monitoring via mobile data collection and remote sensing: Results from the Central African Republic. *PLOS ONE*.

Global Problems: Disagreement between land cover products/lack of in-situ data

Solution: GEO-Wiki Engagement Platform

http://www.geo-wiki.org/





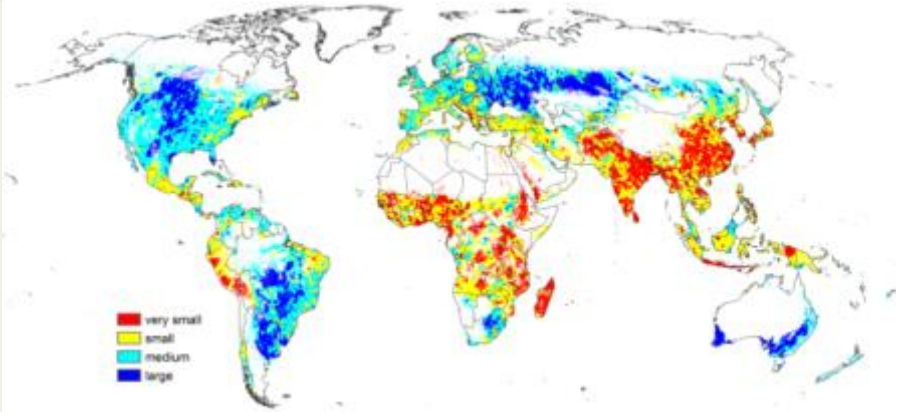
→ A tool for: visualization, validation, crowdsourcing

Global Problem: The need for improved land cover and other new global datasets

Solution: GEO-Wiki Engagement Platform

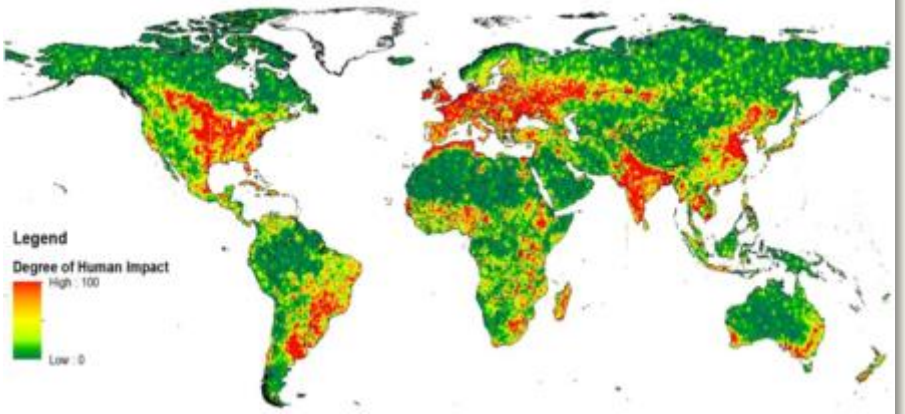
Improving Land Cover via Geo-Wiki

Field Size



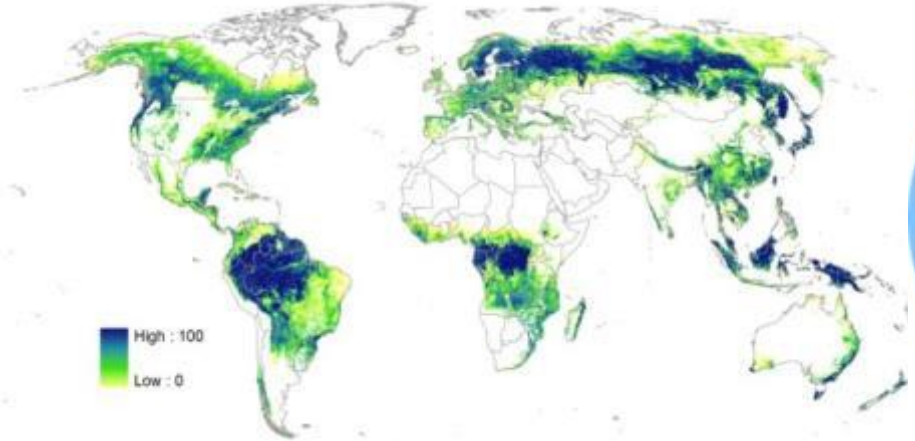
Fritz et al. (2015) in Global Change Biology

Wilderness



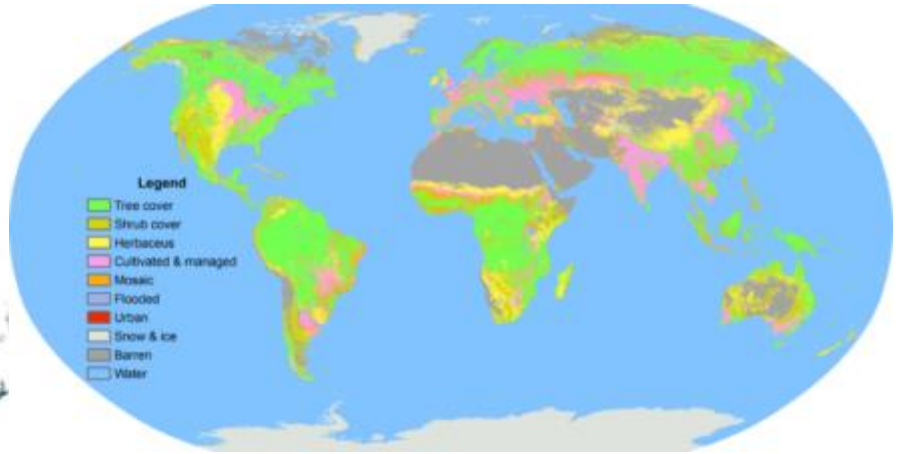
See et al. (2015) in Technological Forecasting and Social Change

Forest Cover



Schepaschenko et al. (2015) in Remote Sensing of Environment

Hybrid Land Cover



See et al. (2014) in ISPRS Photogrammetry and Remote Sensing

Global Problem:

Locating the world's croplands

Solution:

Cropland Capture

Entering the World of Mobile Serious Games

http://geo-wiki.org/oldgames/croplandcapture

Global Problems: Deforestation, Human Impact, Natural Disasters, Water Scarcity

Solution: Picture Pile

http://geo-wiki.org/games/picturepile

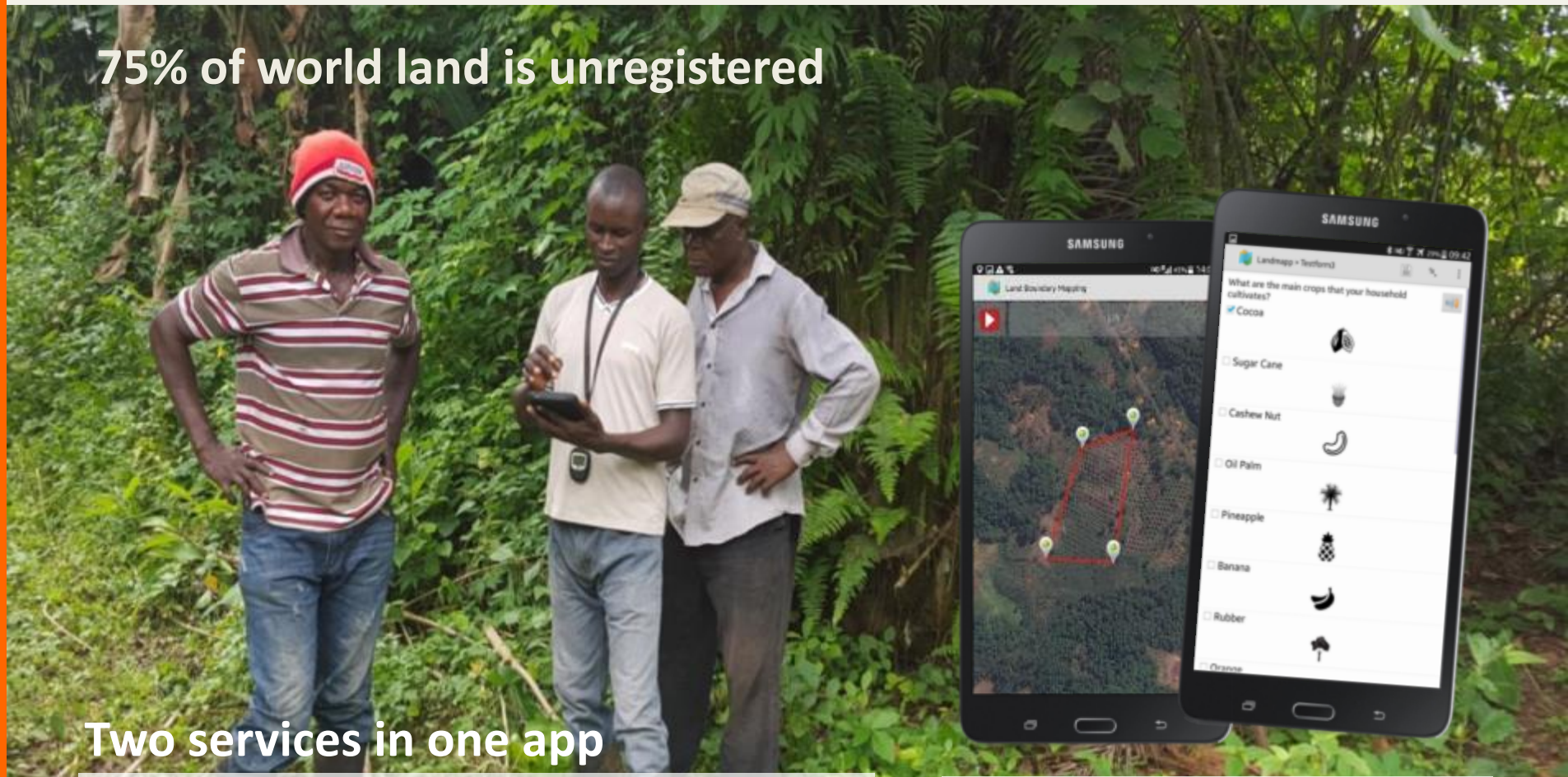
Global Problem: Illegal Logging

Solution:

Moabi DRC is an independent initiative to collaboratively monitor natural resource use in the Democratic Republic of the Congo.

Global Problem: Land tenure uncertainty

Solution: LANDMAPP



75% of world land is unregistered

Two services in one app

1 Land Tenure

Many countries are recognising the economic value of clarifying land tenure.

2 Traceability

Major consumer brands increasingly need to prove sustainability in supply chains

A mobile platform that allows farmers and communities to affordably map their land and begin to unlock its value.

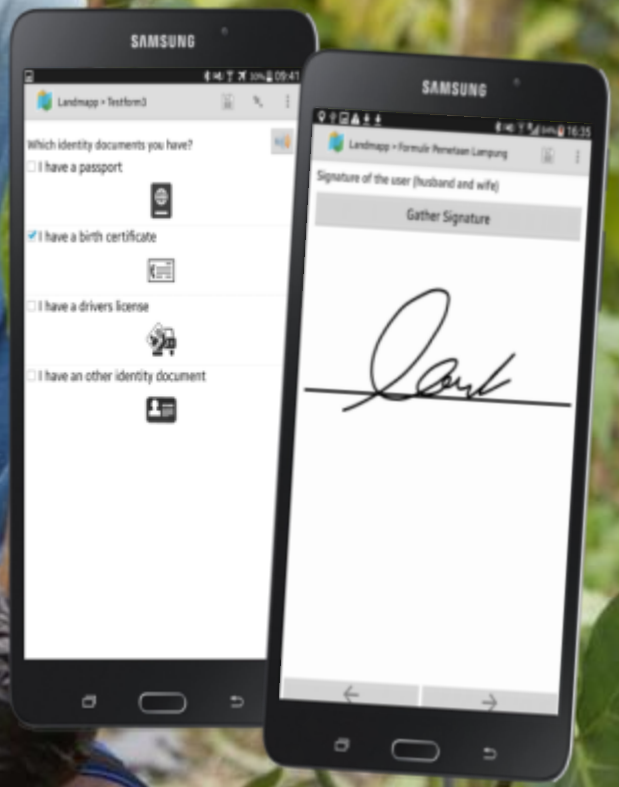
LANDMAPP

For farmers

Land profiles with crop metrics

Land certificates at low price

Microfinance access

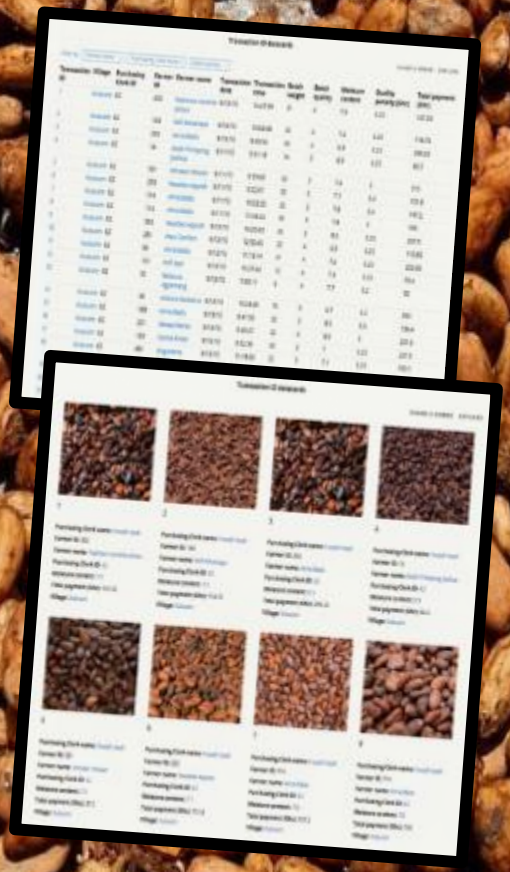


LANDMAPP

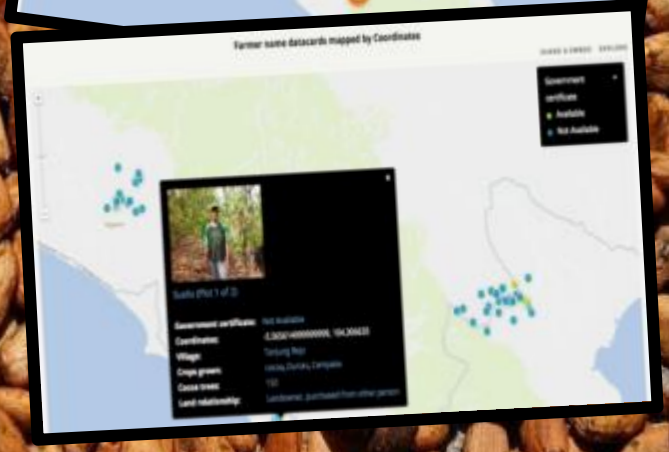
For buyers

Farmer dashboards

Product dashboards



Village and area maps



Some Lessons from Mobile Citizen Science

- Think carefully about how best to **engage citizens** – media, feedback and dialogue, gamificition, incentives (sometimes)
- **Design for scaling** – pilots, stress testing
- Focus on the **big problems and the big solutions**
- **Build with business** people from the start – they know about scale!
- Build **platforms** as well as products

And three questions to you

- How can you engage citizens in helping to improve your science and policy making?
- Where can you combine your efforts with others and rethink for scale?
- Are you talking to business people, marketers and communicators to sell, systematise, fund and scale your science?

The epistemological shift

The epistemological shift

The epistemological shift

scistarter
Science we can do together.

“Had we but world enough, and time”

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Recap: Questions to you

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