



G4AW

Geodata for Agriculture and Water

Images: CIAT & ESA



Netherlands Space Office





Satellite based information services and smallholders



Netherlands Space Office (NSO)

Workshop Pretoria June 18 , 2014



FOOD SECURITY



G4AW

14 partnercountries and (optional) its neighbouring countries

A satellite view of the Earth, showing the African continent in the center, surrounded by the Atlantic Ocean to the west and the Indian Ocean to the east. The image is set against a dark green background. The text is overlaid on the left side of the image.

Improving Foodsecurity Innovation from Satellites and IT for smallholders



South Africa

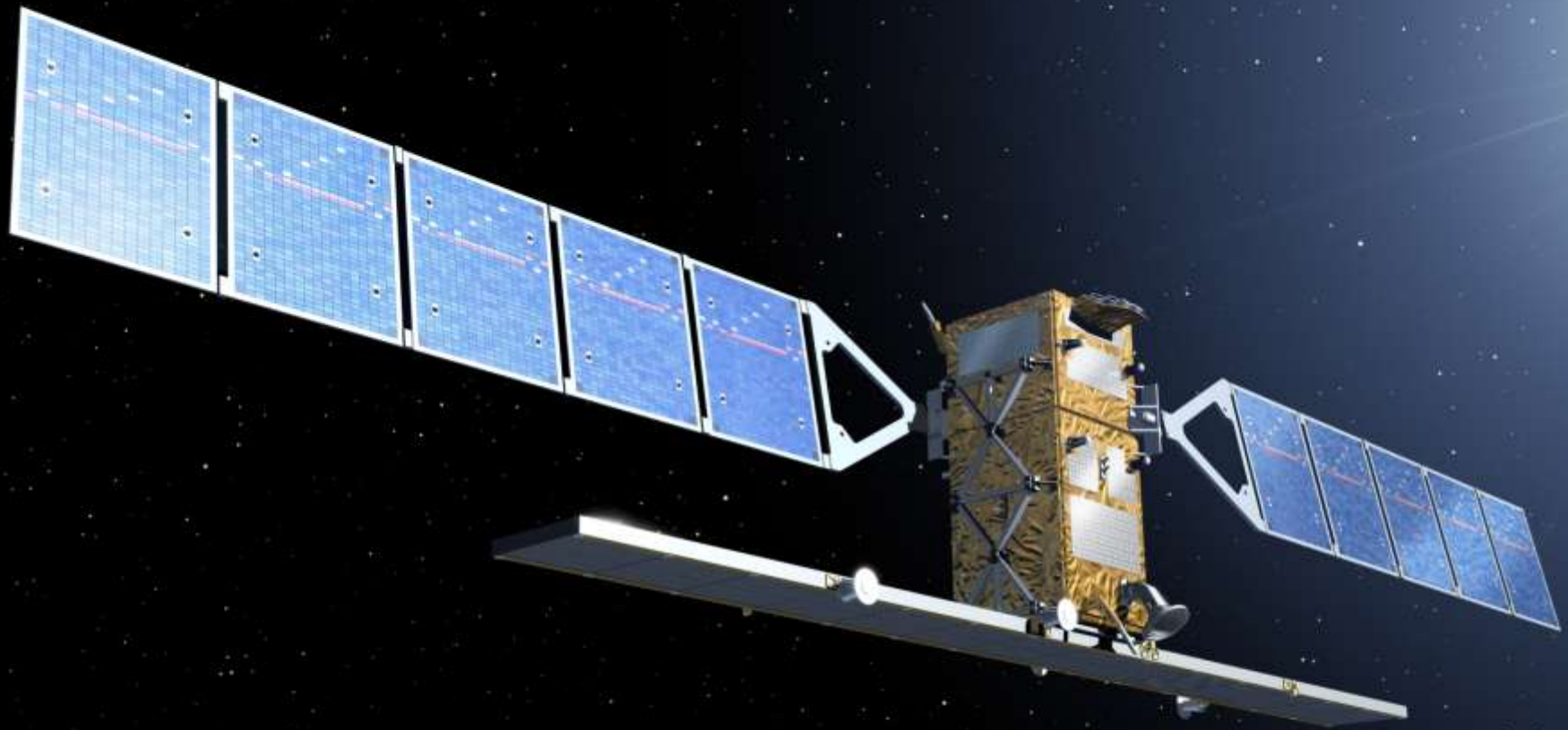
**Effects of climate change on
Food & Water security**



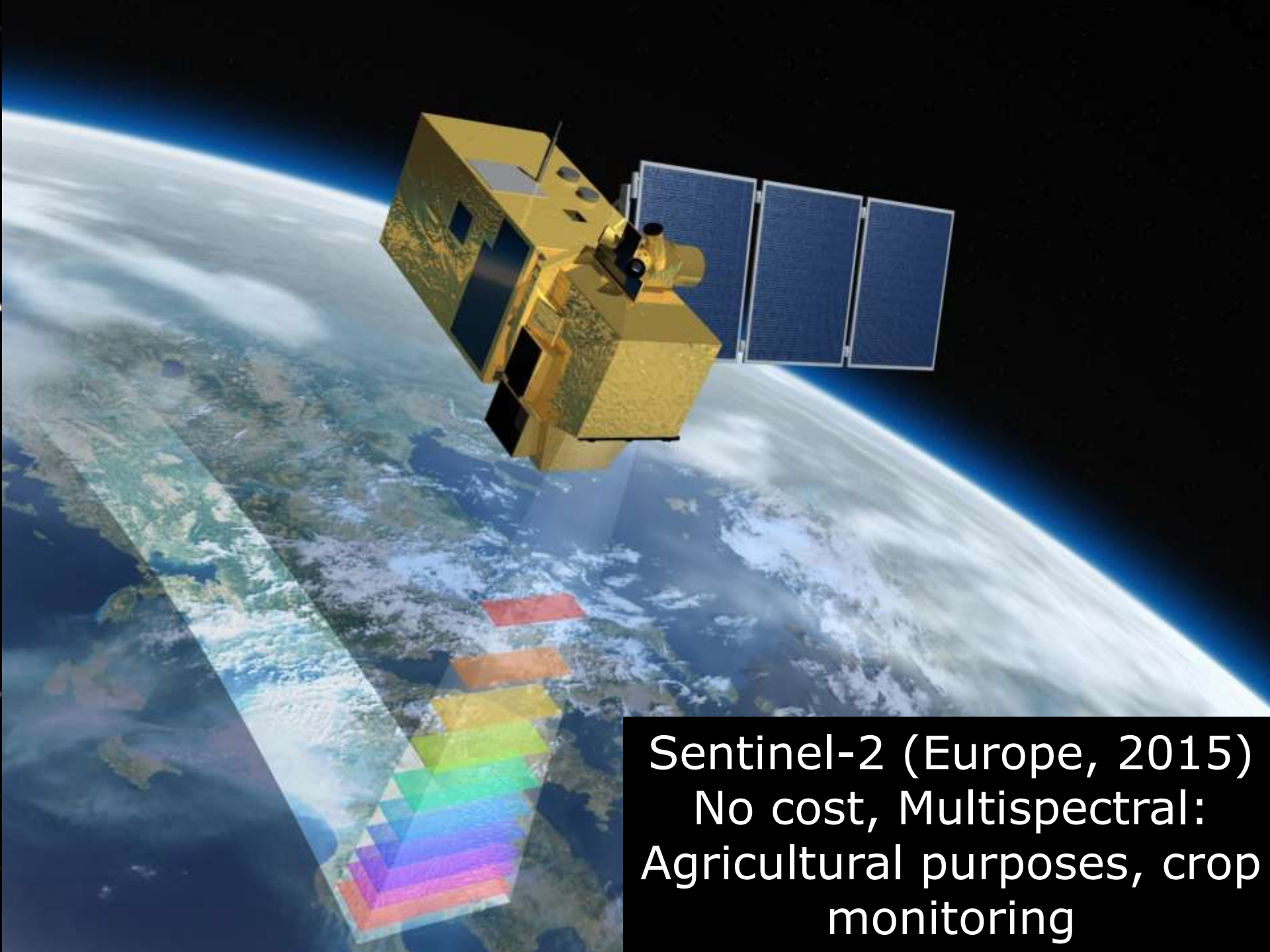
Why using satellite data (Geodata)?

1. Objective, consistent, cross border
2. (local) monitoring infrastructure is lacking or too little
3. 25+ years time series (geostationary from satellites as Landsat(series) available
4. Many new satellites (to be) launched, no or low cost





Sentinel-1 (Europe, 2014)
No cost
Looking through clouds, day & night



Sentinel-2 (Europe, 2015)
No cost, Multispectral:
Agricultural purposes, crop
monitoring

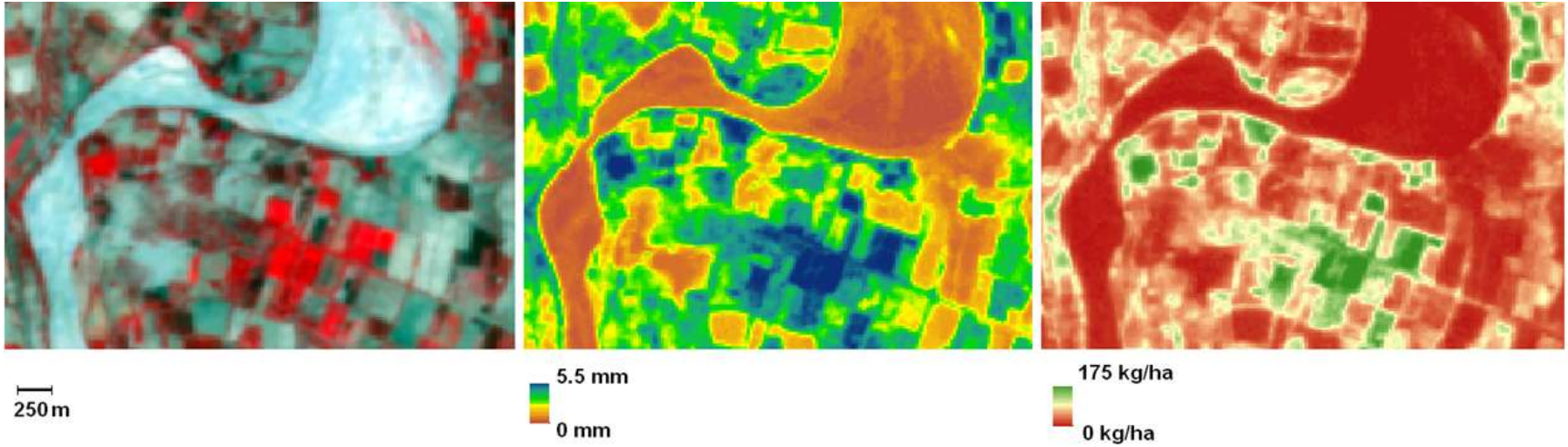


Planet Labs (2014)



Skybox (2014)

Constellation
High revisit time
Commercial
Low cost



Example

Raw satellite data (left), derived daily evapotranspiration (middle) and biomass production (right).

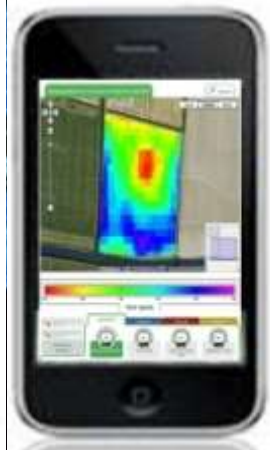


Possible services

1. Crop calendars
2. Weather information
3. Mapping
4. Monitoring (e.g. vegetation growth)
5. Irrigation / nutrient supply advices
6. Insurance (crop and livestock)
7. Early warning (drought, floods)



1. Stand alone
2. Integrated in value chain services
3. Complementary to micro-insurance





3 different sectors for Geodata application

1. Mapping (GIS)
2. Farm/Crop management (Crop calendar)
3. Riskmanagement (index based weather insurance and early warning)

Challenge smallholder/foodproducer:

bridging the last mile



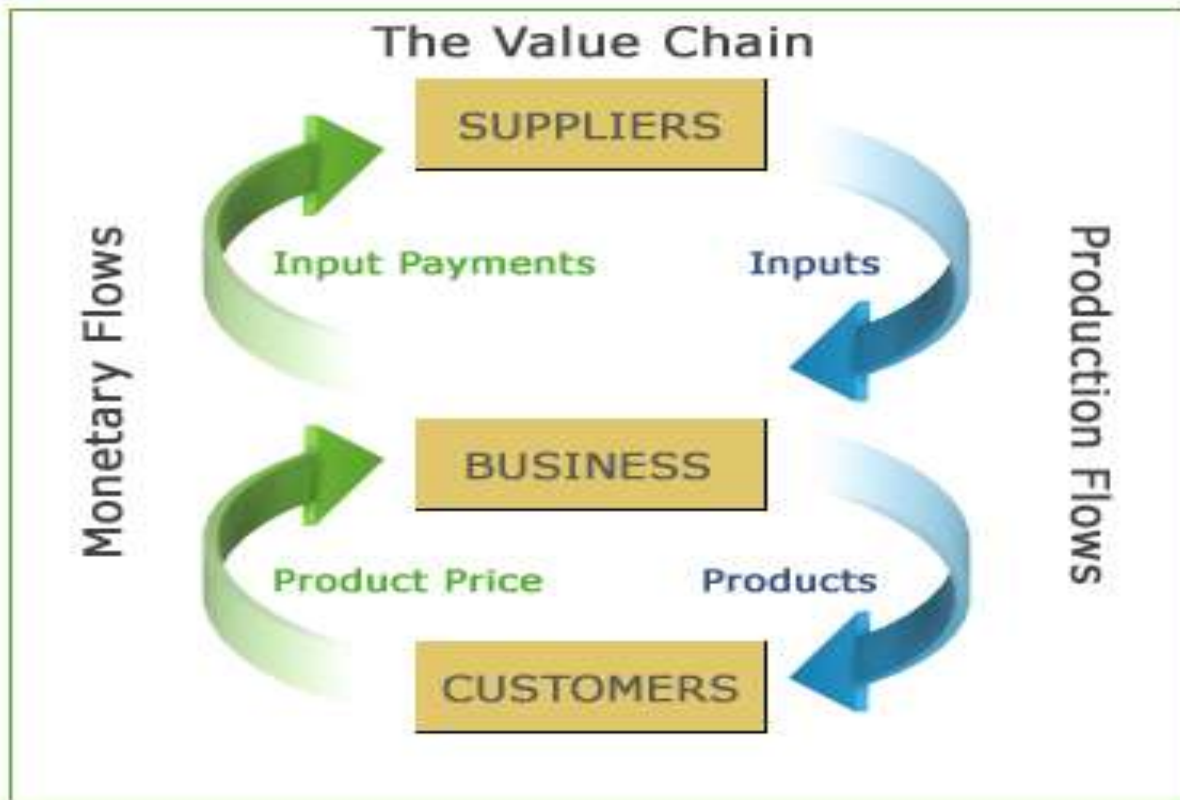
Information chain – services





Value chain (business model)

- from information to services; adding value for a decision supporting information system





Index based weather insurance

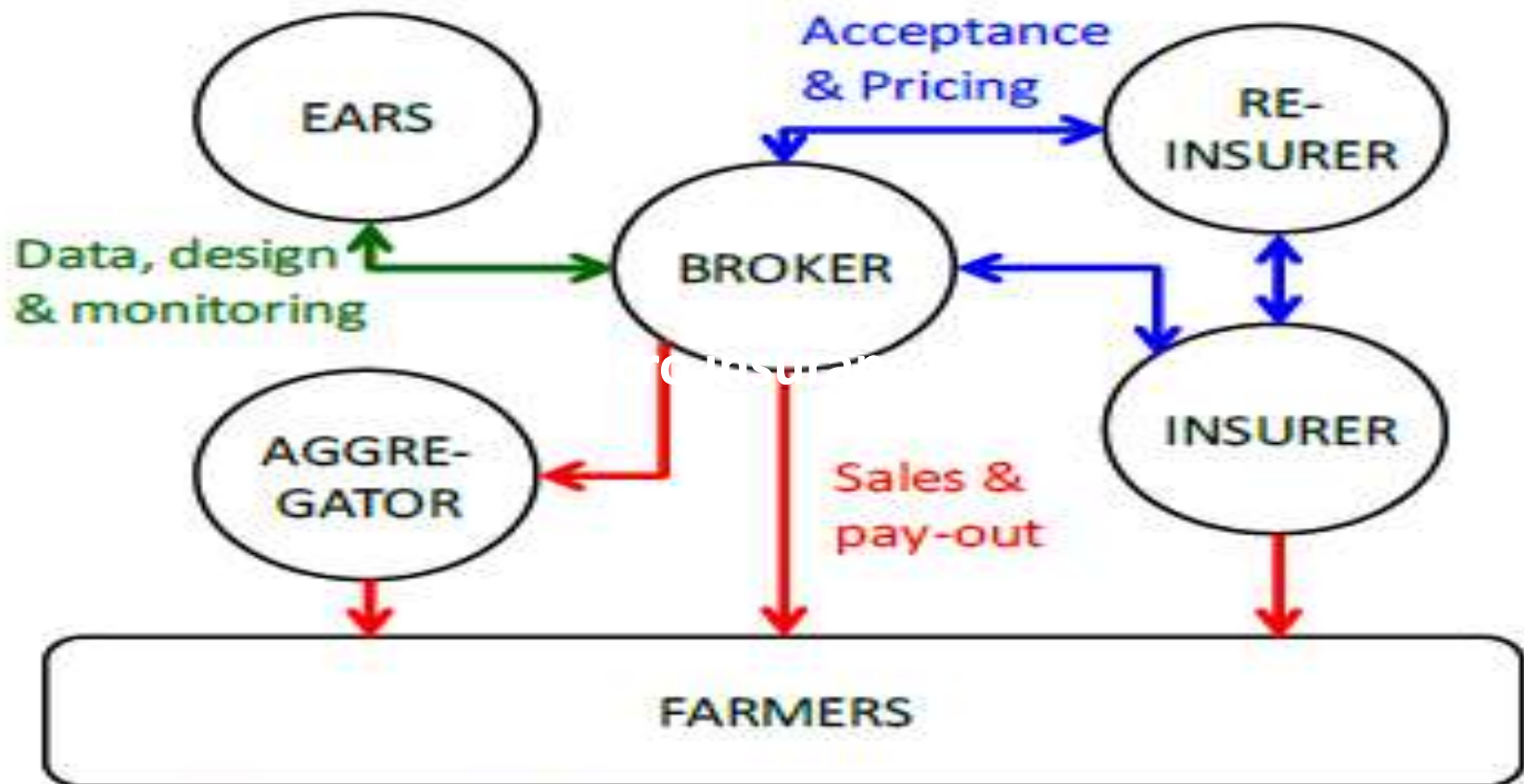


Figure 8.1: Scheme of the index insurance service chain.



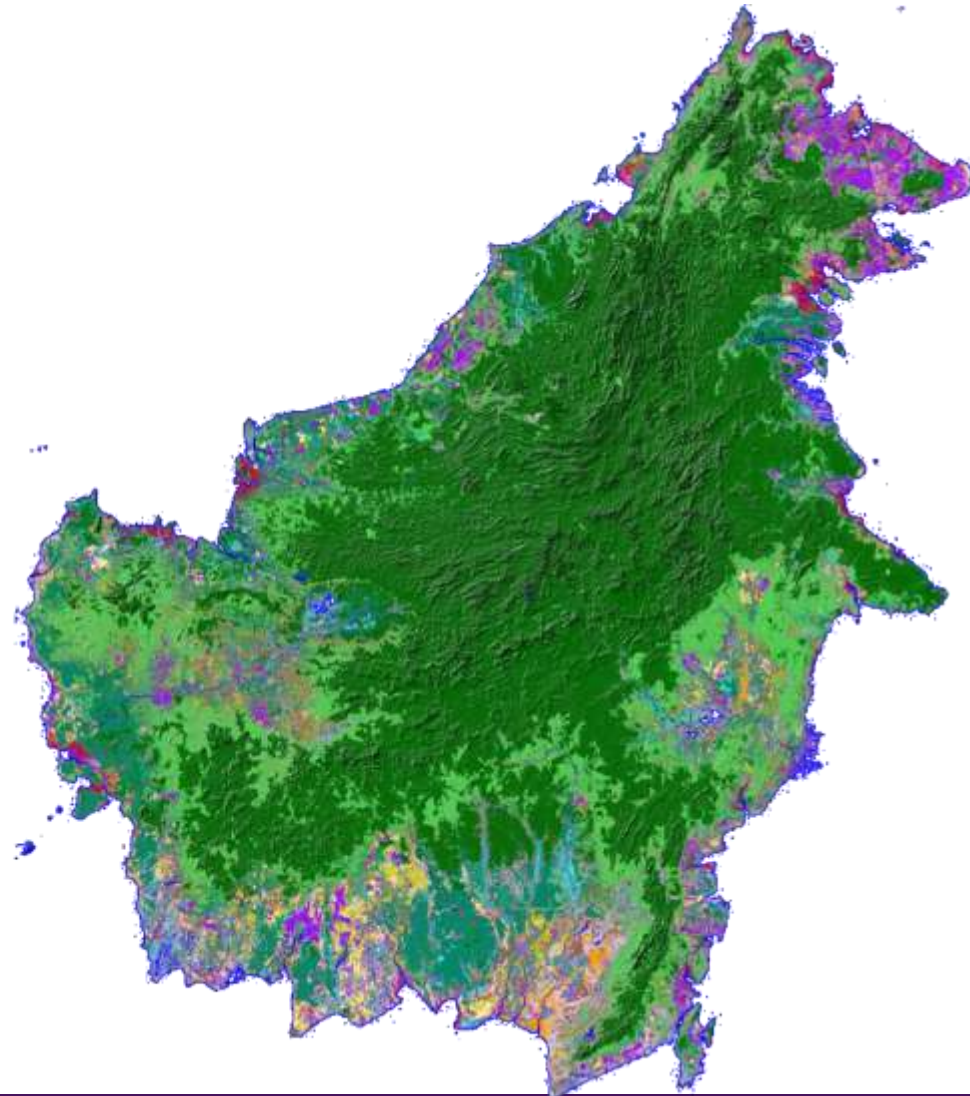
An overview of the services

- Mapping (land mapping)
- Farm management practice
- Riskmanagement



Land cover maps

Kalimantan Land cover map (radar) (SarVision)



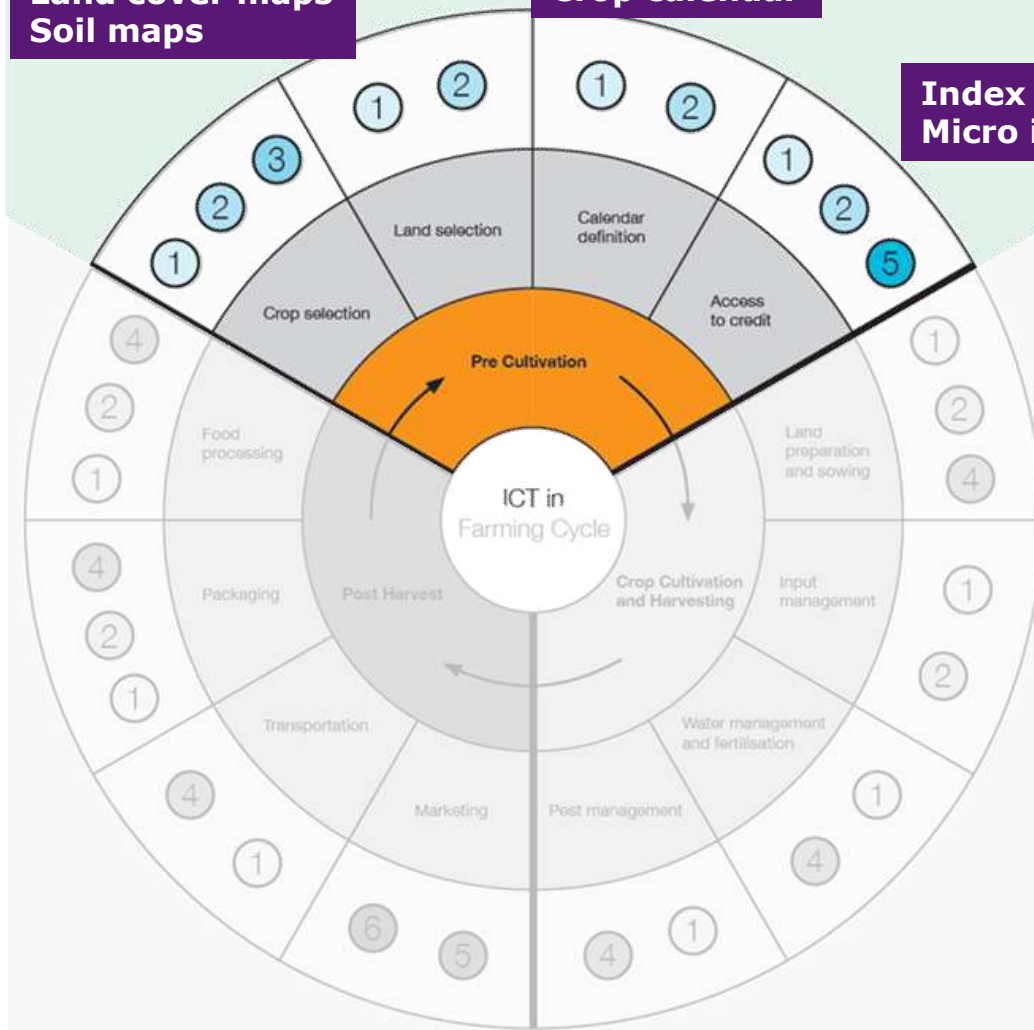
Farm management Crop calendar

Land cover maps
Soil maps

Crop calendar

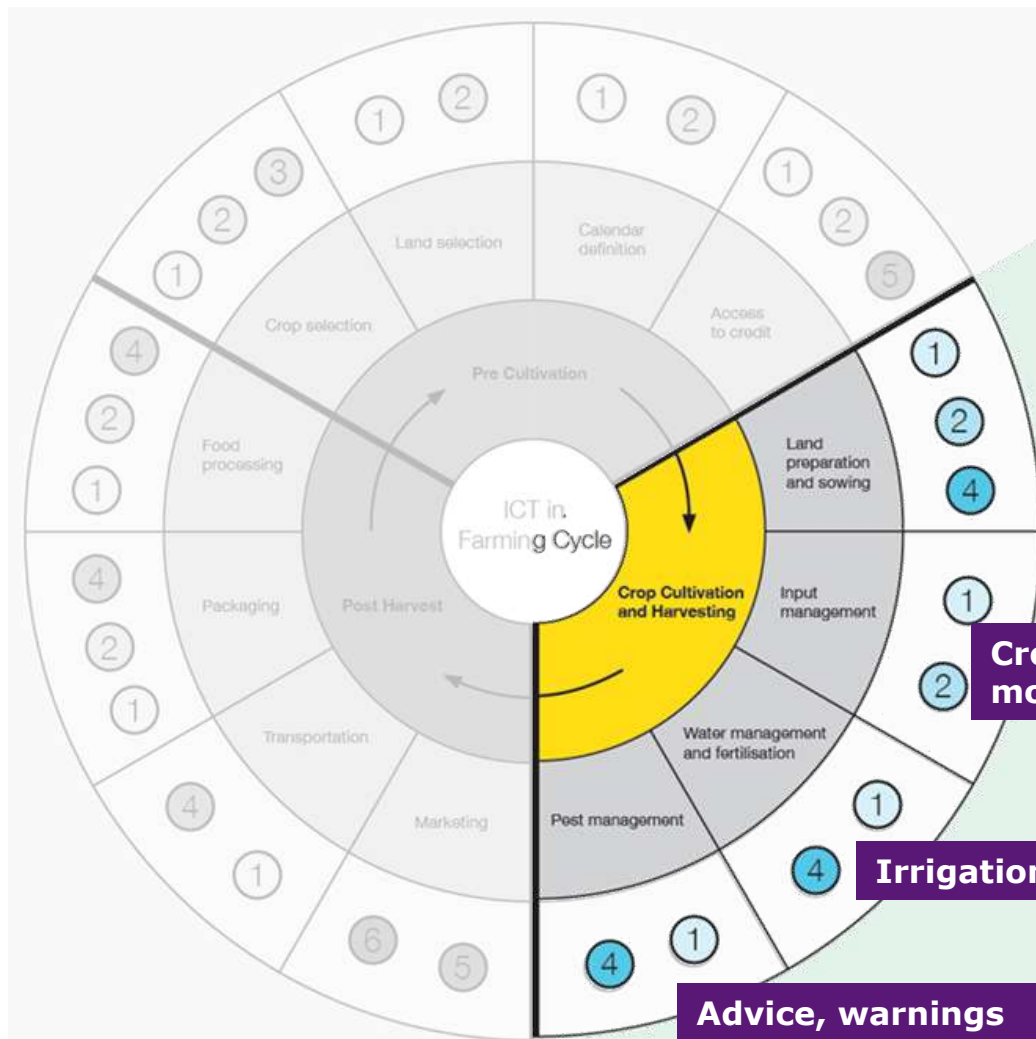
Index based
Micro insurance

- 1 Information systems including DSS/MISS/GIS etc
- 2 ICT-enabled learning and knowledge exchange
- 3 Modelling solutions
- 4 Sensory and proximity devices
- 5 ICT-enabled networking solutions
- 6 Online commerce tools (eCommerce/mCommerce)



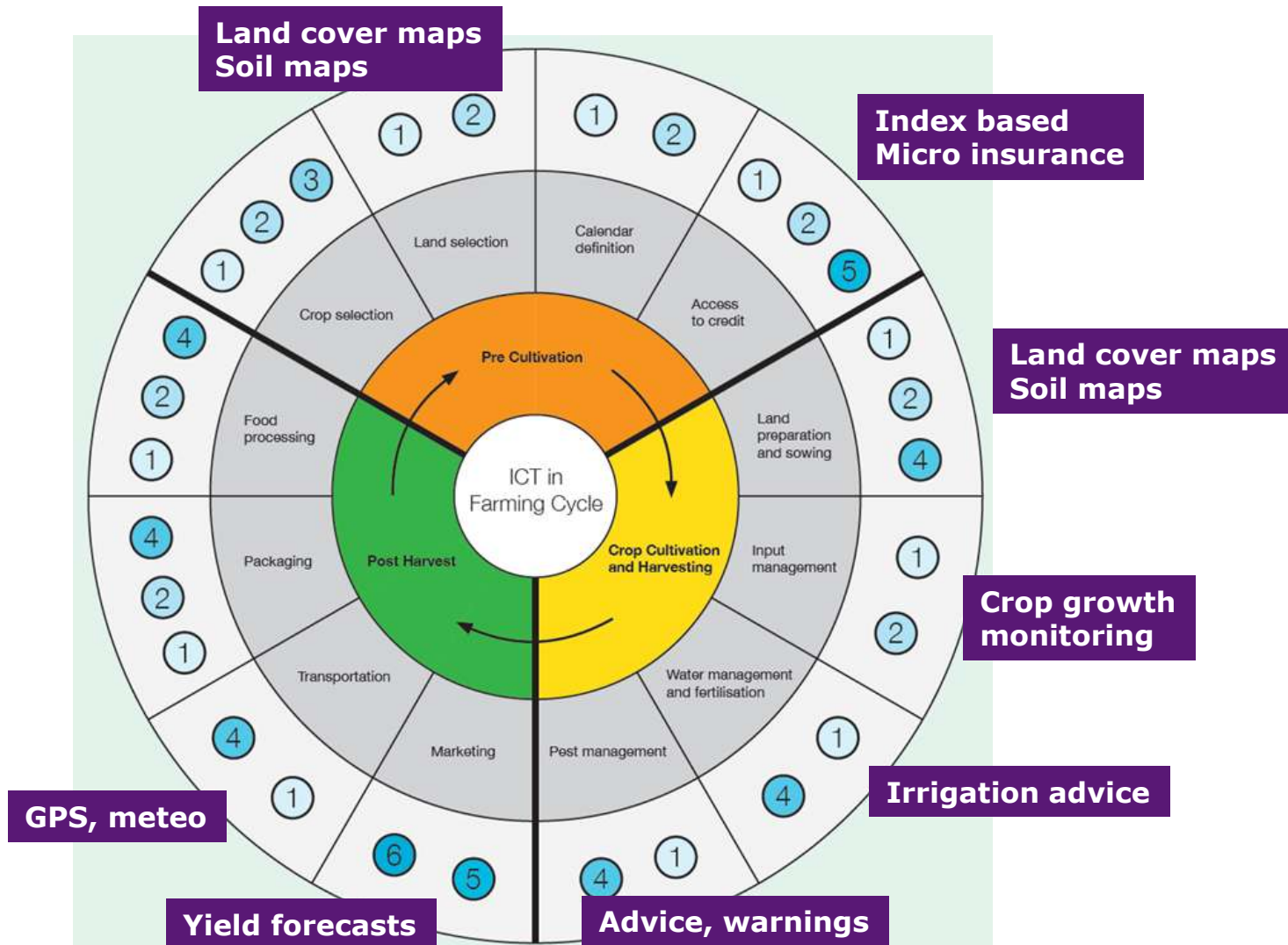
Farm management Crop calendar

- ① Information systems including DSS/MISS/GIS etc
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- ③ Modelling solutions
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- ⑤ ICT-enabled networking solutions
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Farm management Crop calendar

- 1 Information systems including DSS/MISS/GIS etc
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Farm management Crop growth monitoring



Cloud
free
radar
image



Farm management Crop growth monitoring

Sugar beet at 25m resolution every
24 days

22/04/2012



Radar analysis

Bare soil



Farm management Crop growth monitoring

Sugar beet at 25m resolution every
24 days

16/05/2012



Radar analysis

Bare soil
Emergence



Farm management Crop growth monitoring

Sugar beet at 25m resolution every
24 days

09/06/2012



Radar analysis

Bare soil
Emergence
Increment



Farm management Crop growth monitoring

Sugar beet at 25m resolution every
24 days

03/07/2012



Radar analysis

Bare soil
Emergence
Increment
Closure



Farm management Crop growth monitoring

Sugar beet at 25m resolution every
24 days

07/10/2012



Radar analysis

Bare soil
Emergence
Increment
Closure
Harvest



Irrigation advice

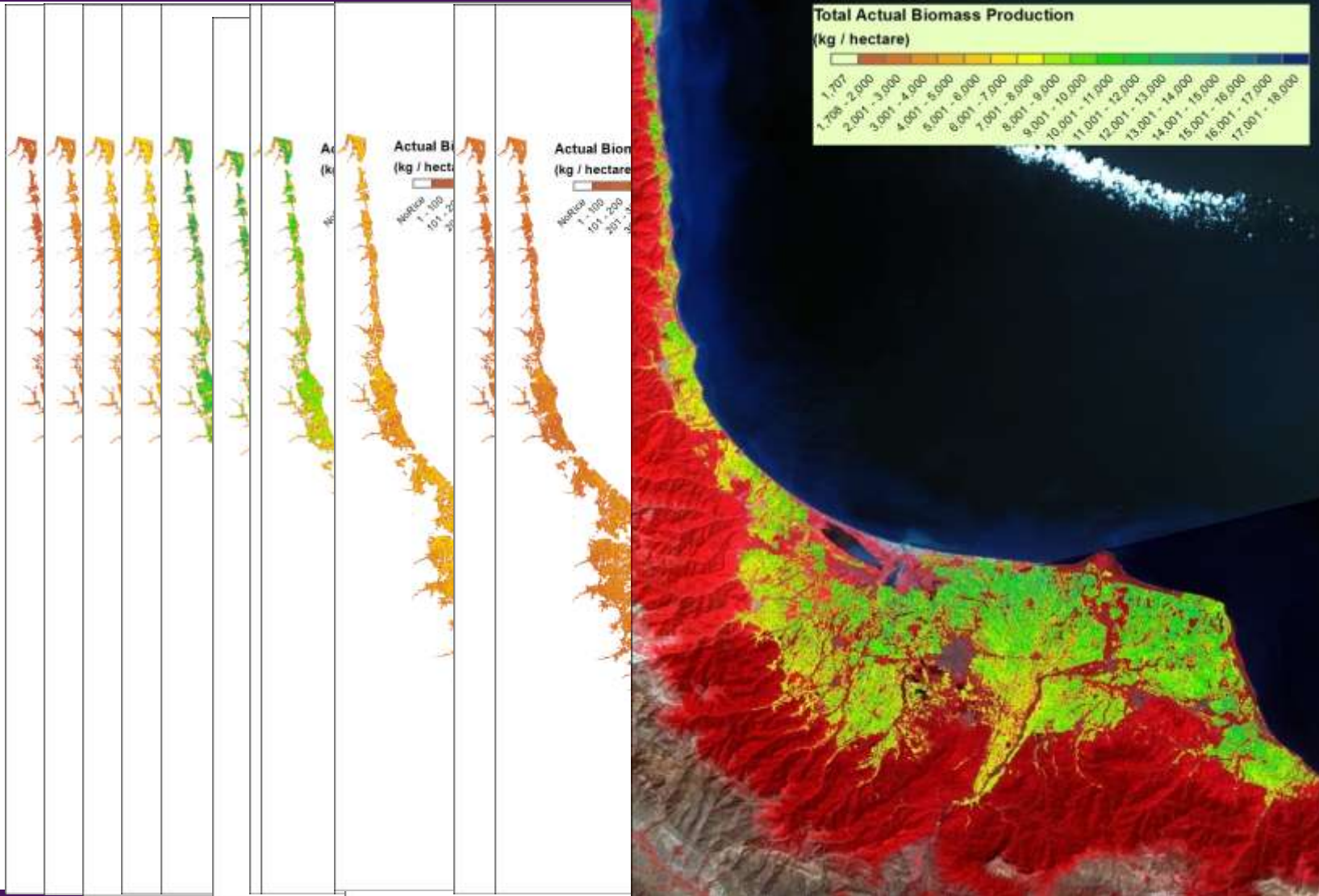


The crop has no water stress when the soil moisture is above the critical level and below the field capacity

When the soil moisture drops below the critical line, irrigation is advised



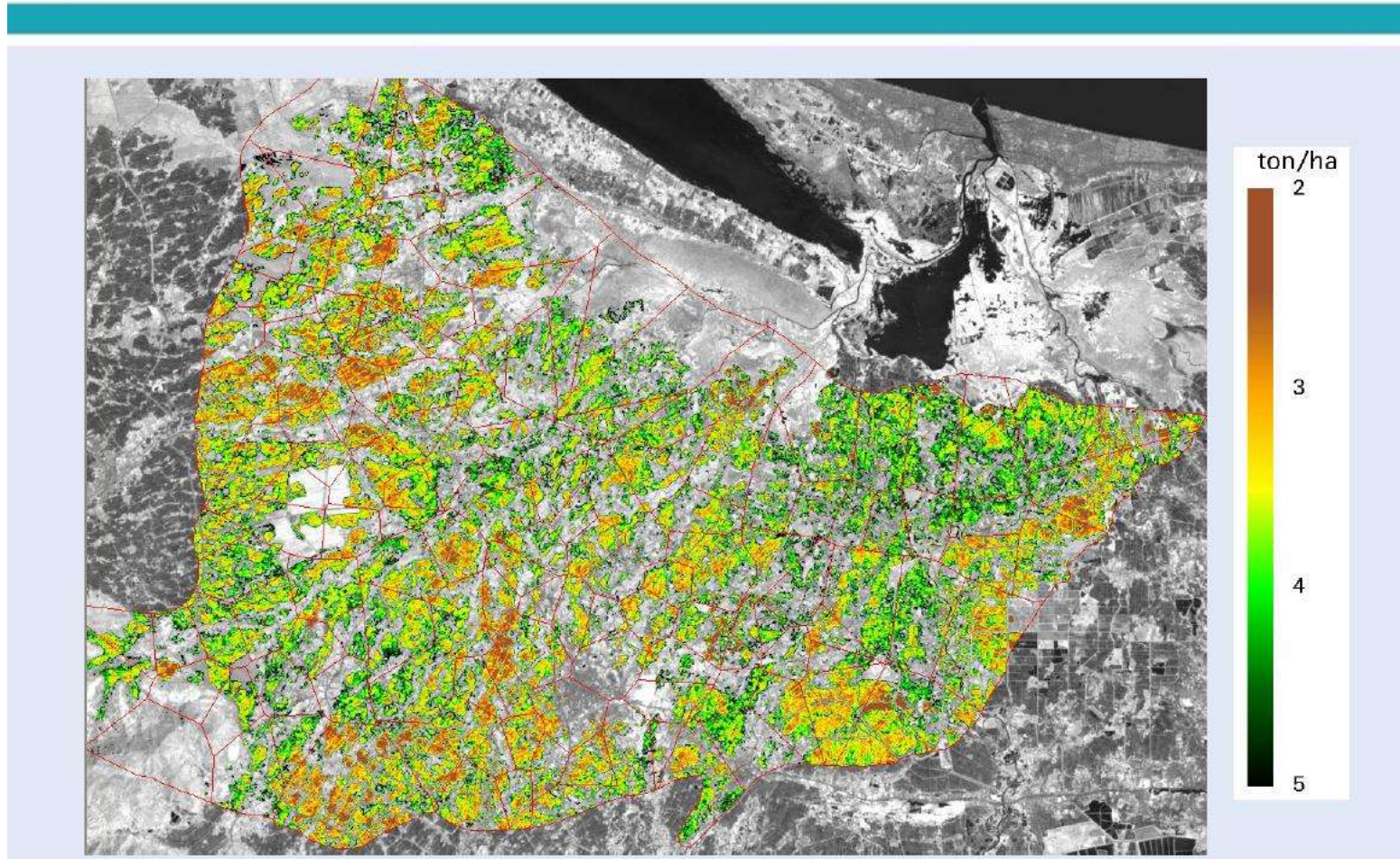
Yield forecast



GSM: Actual Biomass Production



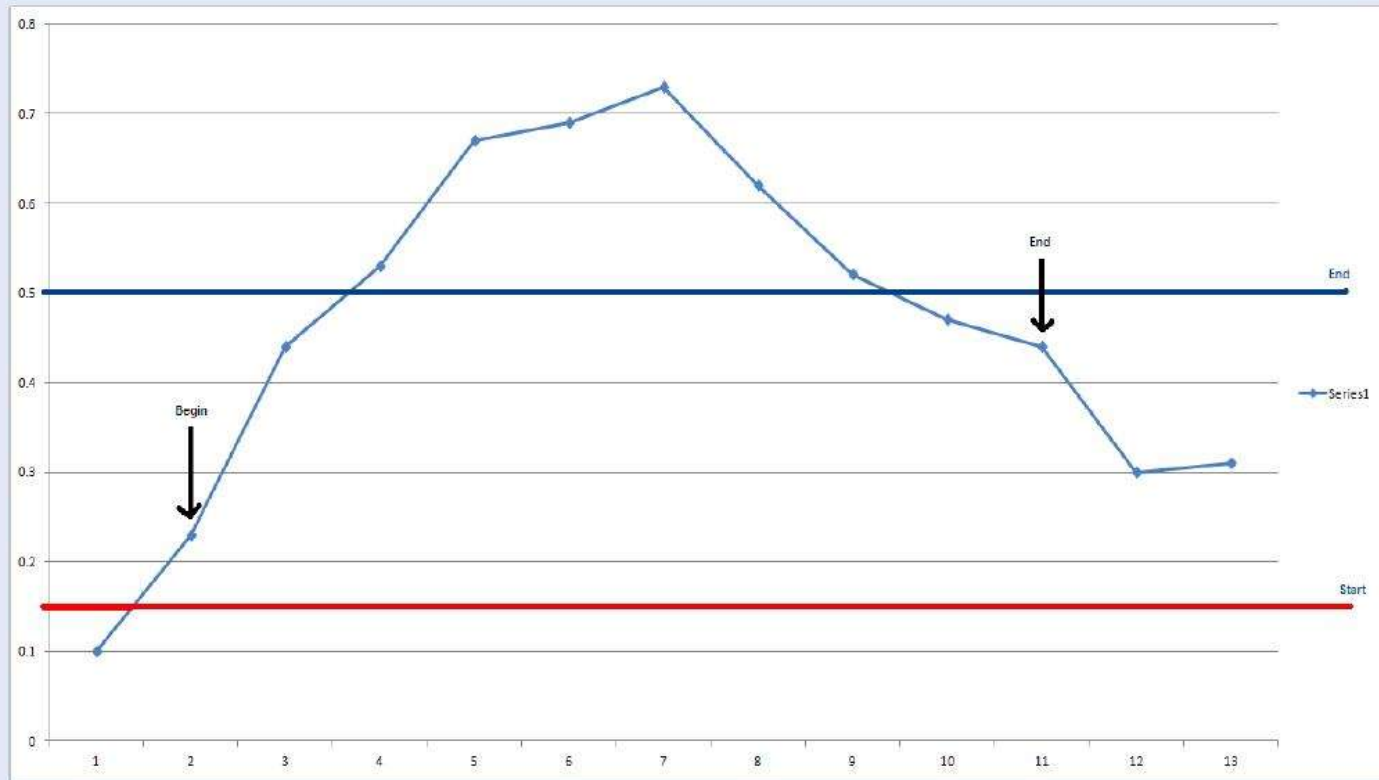
Rice Yield maps






Yield forecast

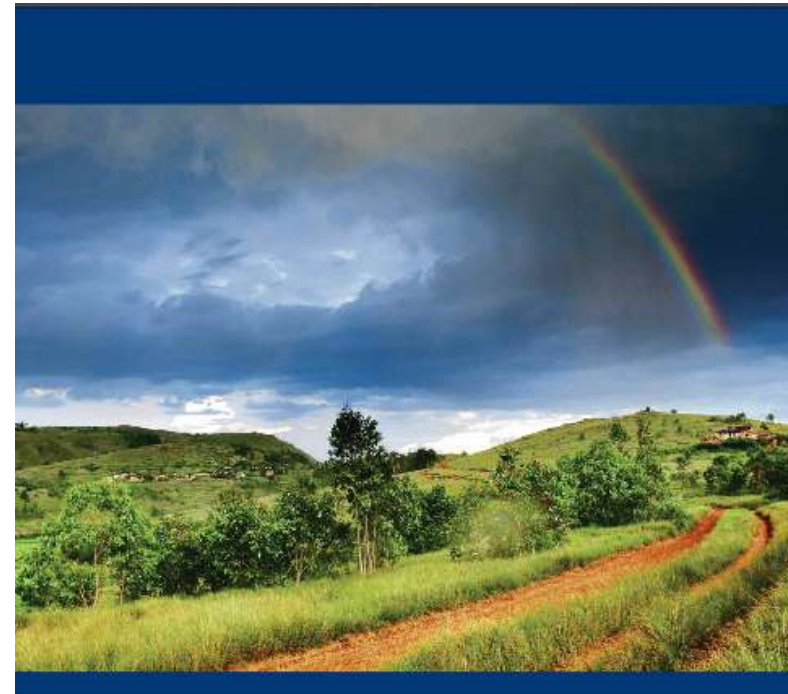
Rice yield monitoring example using remote sensing





Risk management Micro insurance

- Many pilot projects
- Examples:
 - Kilimo Salama  Kilimo Salama Foundation's Kilimo Salama - Saibapke project
 - Planet Guarantee (EARS FESA project)
 - North of Kenya ILRI
 - and others
- Technically feasible
- Increased mobile use → reach farmers



Weather Index-based Insurance
in Agricultural Development
A Technical Guide

→ Time for Up-scaling



World Food Programme

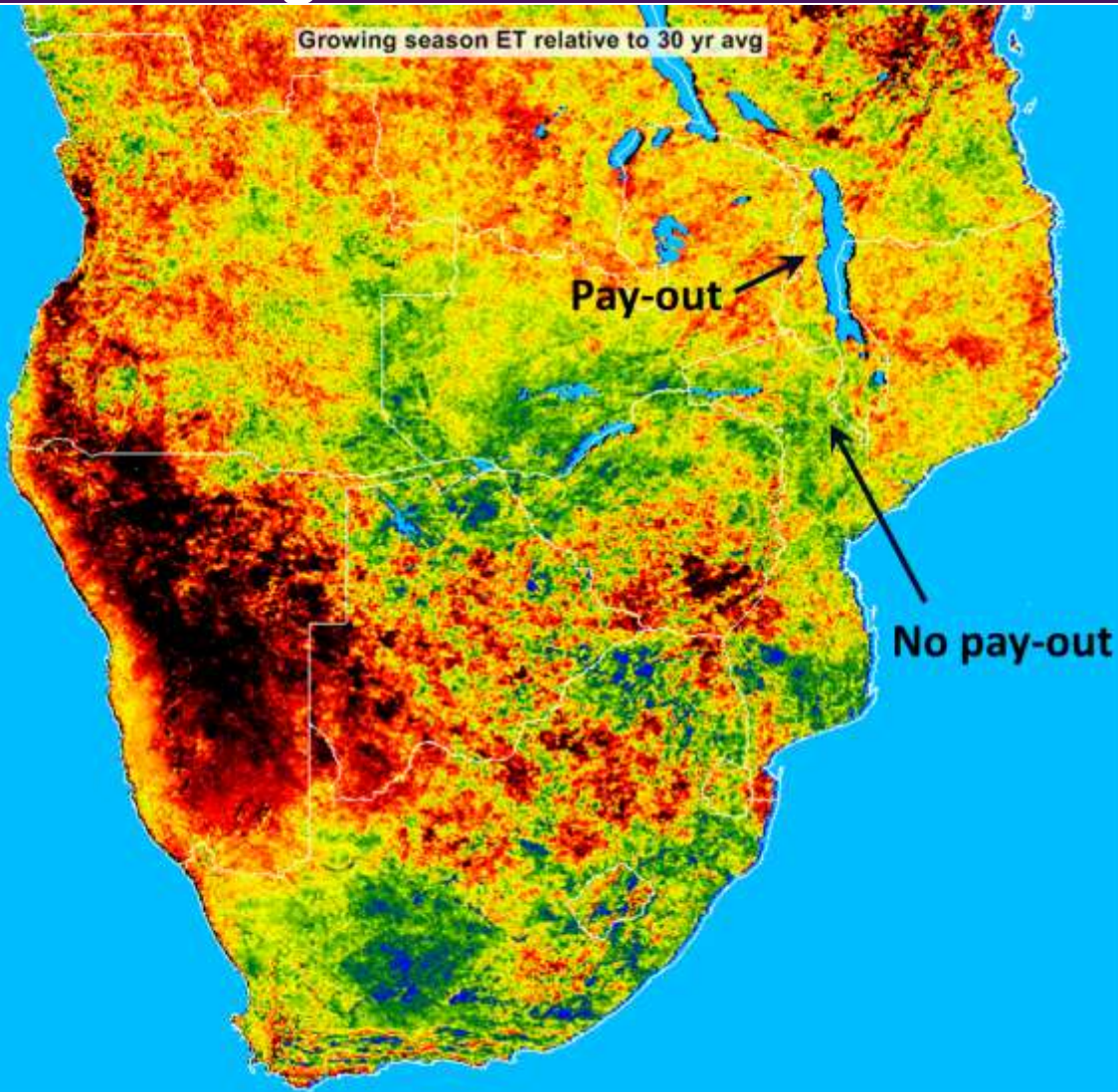


Enabling poor rural people to overcome poverty

http://www.ifad.org/ruralfinance/pub/WII_tech_guide.pdf



Risk management Micro insurance

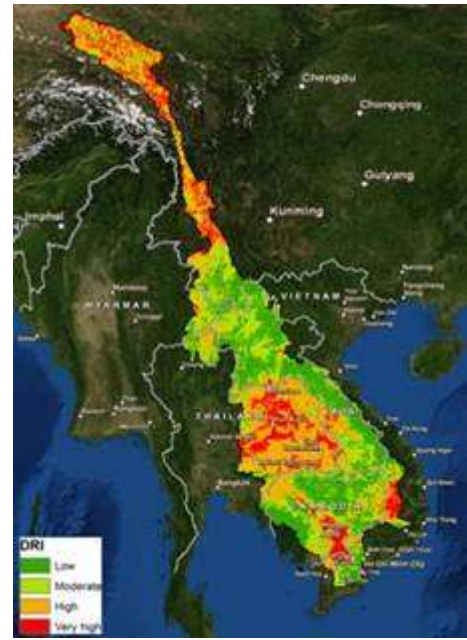
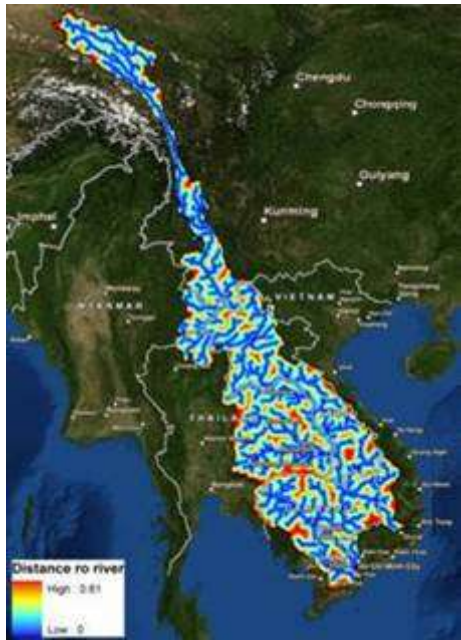


Malawi:
Maize index
insurance
(EARS)



Risk management

Hazard & Risk Analysis



Vulnerability Index
Distance
to river

Vulnerability Index
Population density

Vulnerability Index
Precipitation

Drought
Risk Map



Risk management Early warning

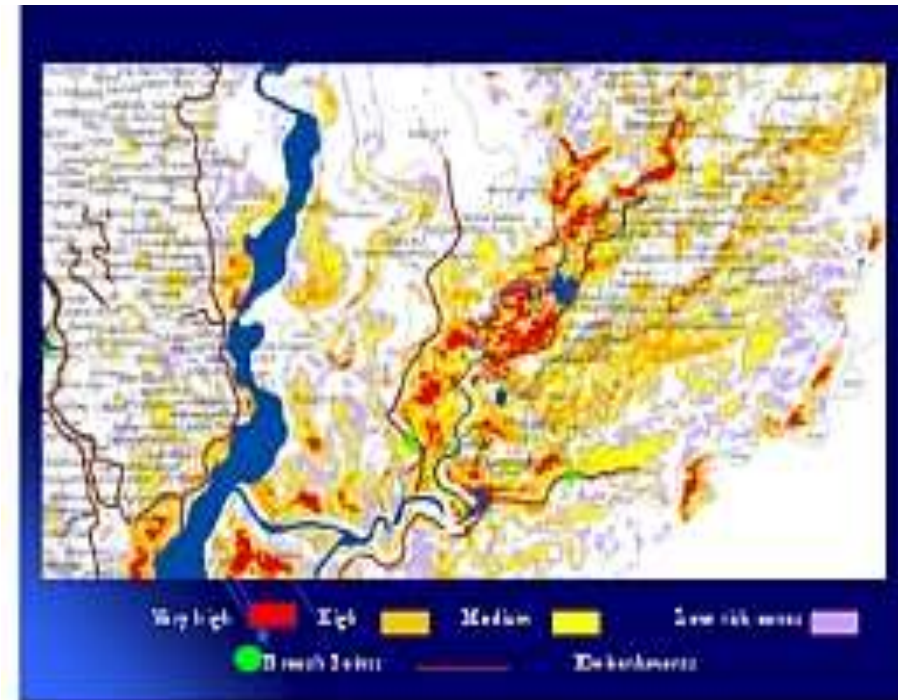
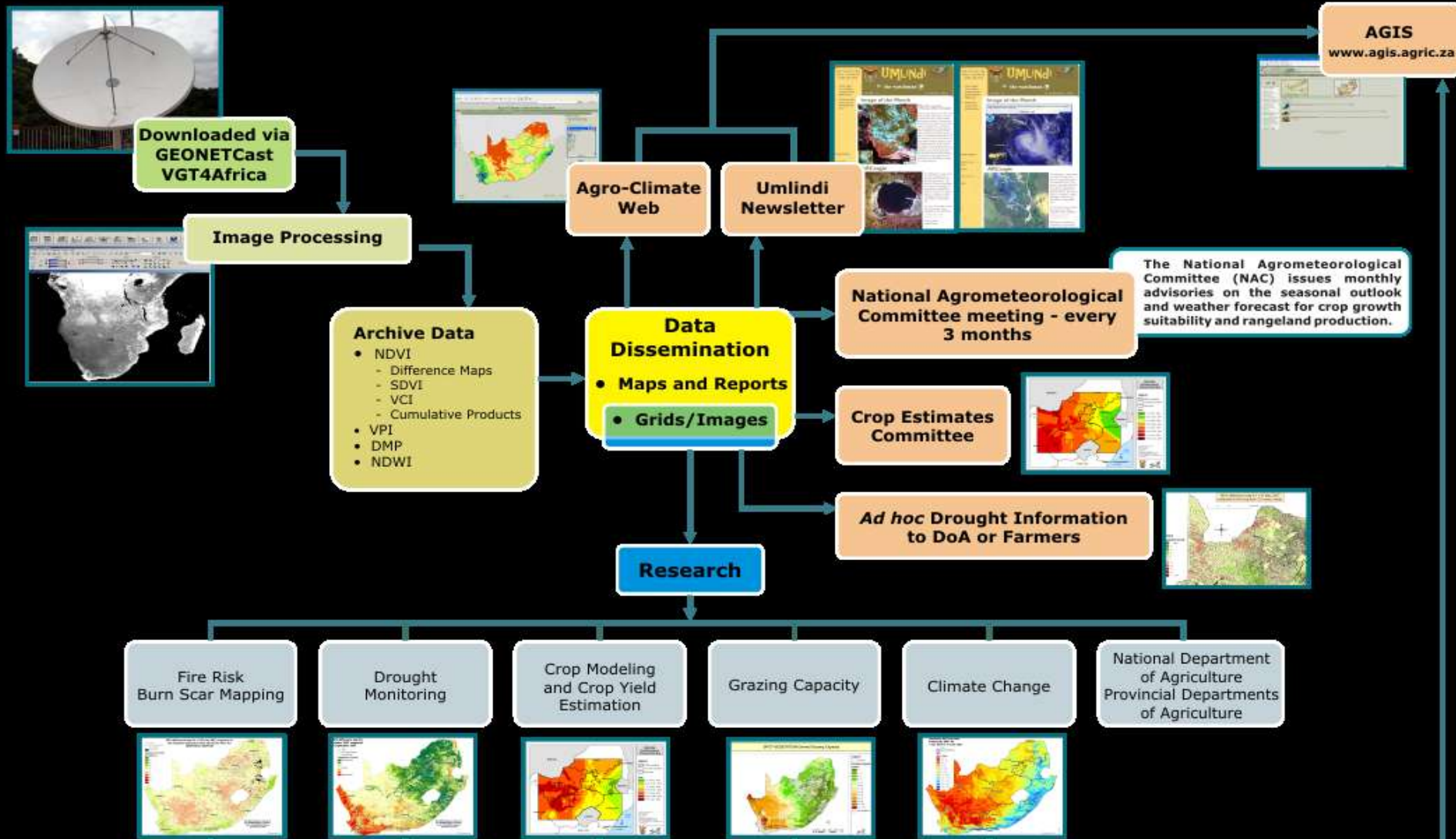


Fig: Flood hazard maps corresponding to various flood discharge and levels

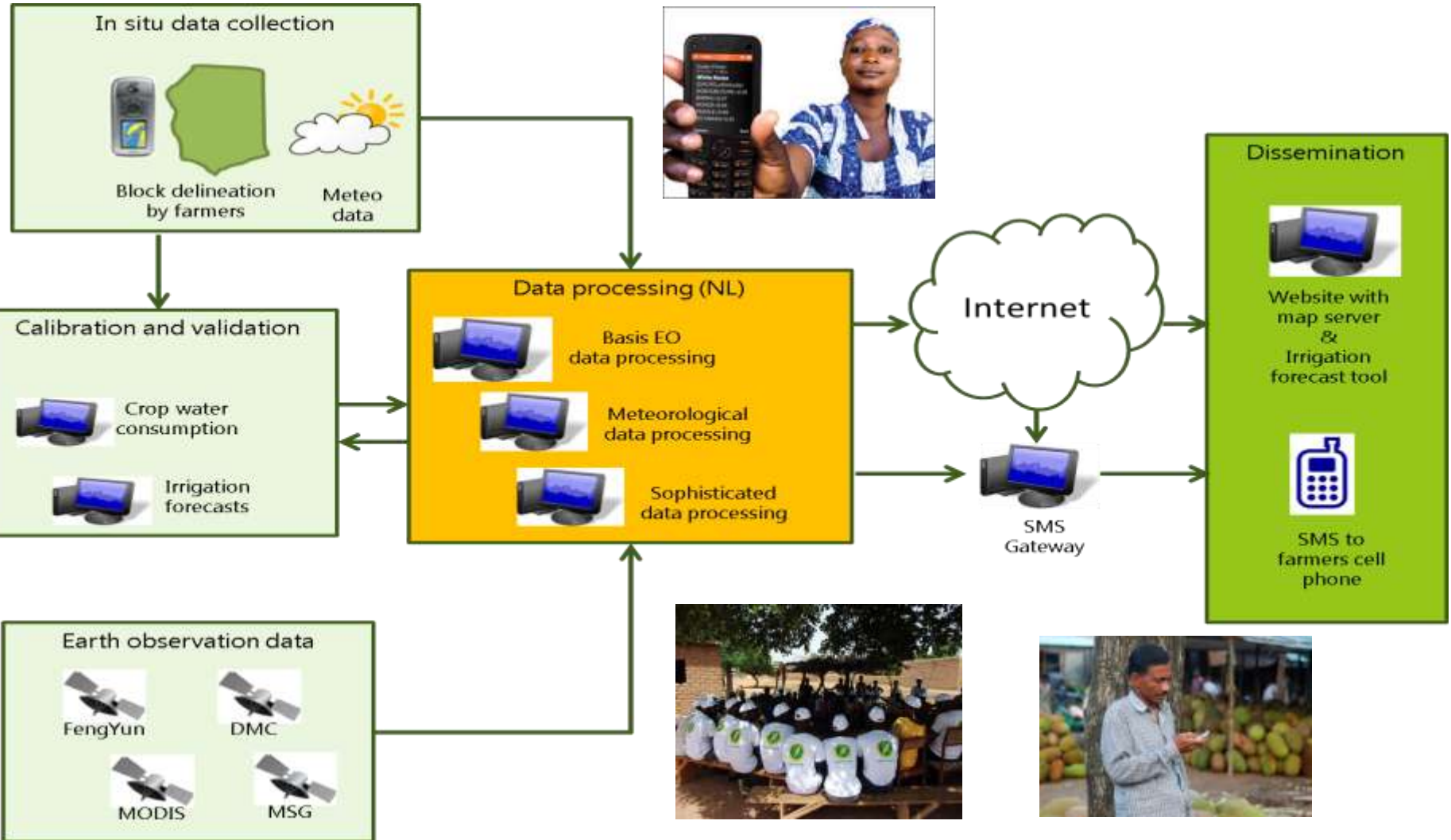
Potential use of spatial data in South Africa



Smallholder ? Bridging the last mile



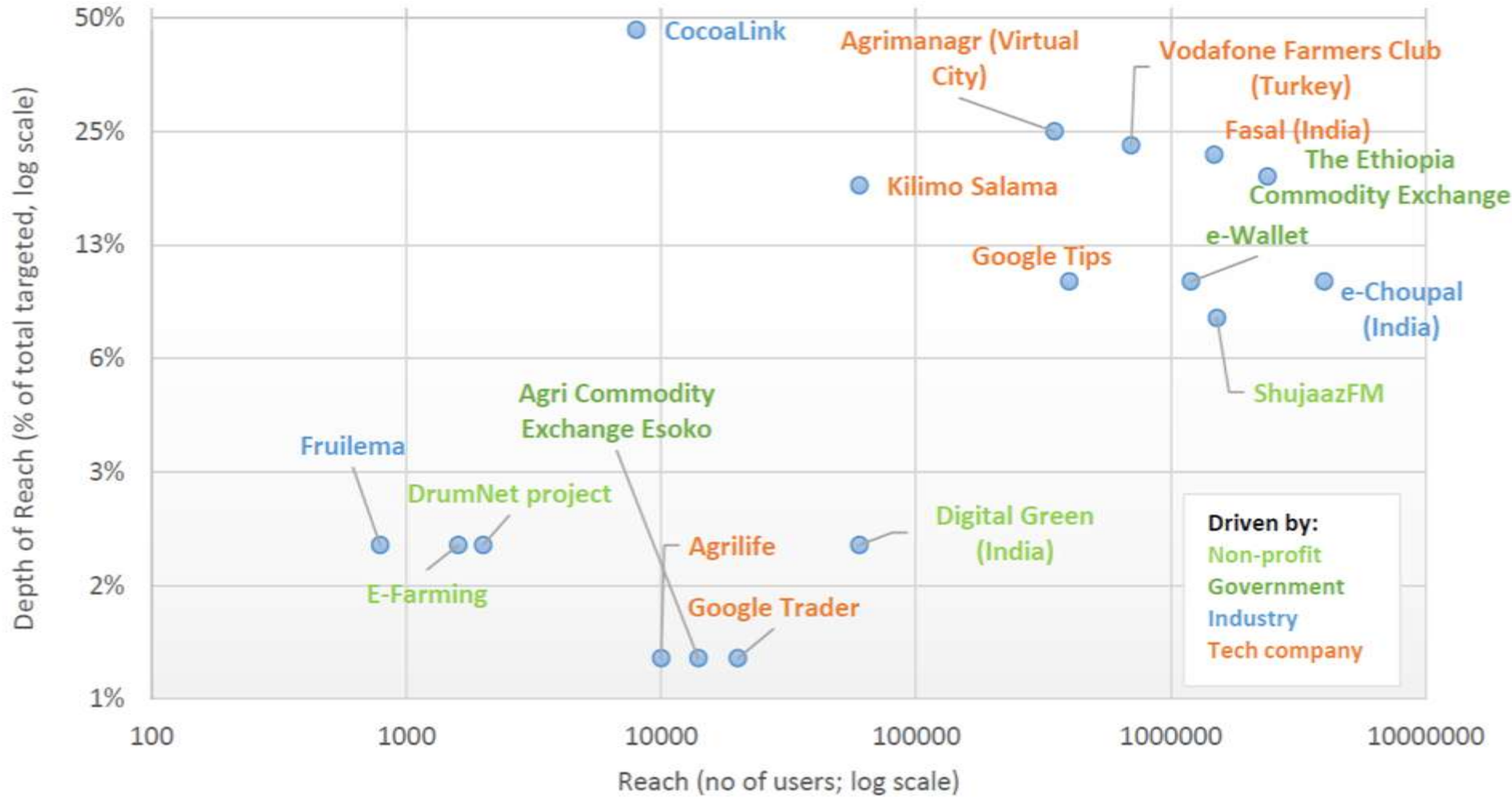
Smart ICT infrastructure



Challenge: bridging the last mile



Reach: Breadth vs Depth (by source of initiative)



Partnership ecosystem

Producing parties

Large scale
Contract farming



Smallholders
farming



Intermediary parties

Employment
agencies

Agri ICT (geo)
services

Contractors

Aggregator
Parties

Cooperatives

Agric .advisors &
Agri services

NGO's

Networker
parties

Government

Institutes &
University
(R&D)

Extension
services

Education &
information

relevant
agencies

Agri- industry

Food industry

Inputs
industry

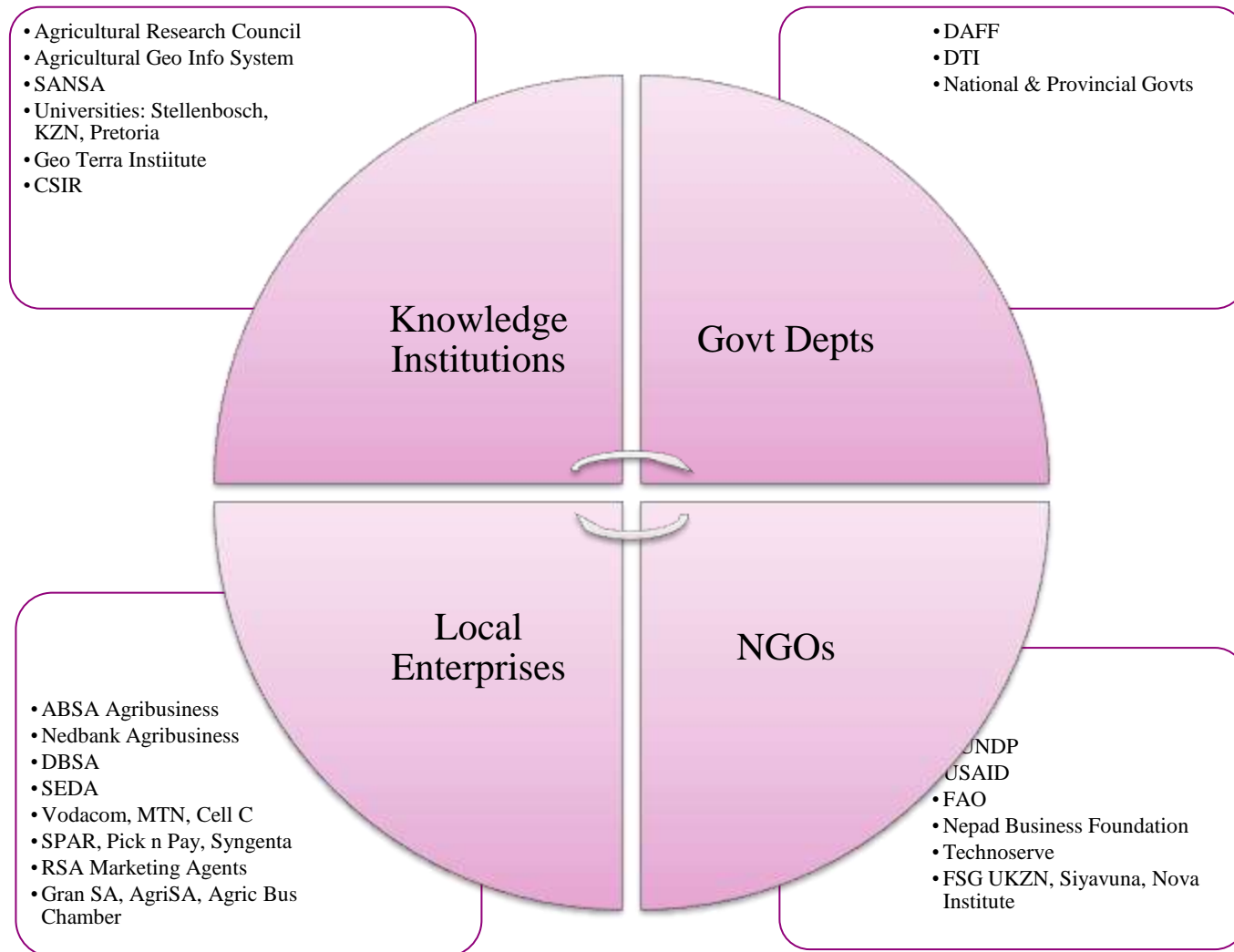
Insurance &
Finance

Telecom
/Satcom

+ ao sectors



Potential partners



www.waterandclimateservices.org

Netherlands
Cooperation
on Water and
Climate Services



*An unique cooperation of 45 Dutch organisations
that offer solutions for water and climate related challenges*

"Joint effort of 45 Dutch private companies, knowledge institutes to create added value within the Information Chain, from satellite to end-user, as a key towards affordable food security and water safety"

General
Information
Services

Flood
Safety
Services

Water
Management
Services

Water
Security
Services

Food
Security
Services

Other
services



Thank you for your attention



More info: www.spaceoffice.nl/g4aw



1st Group session

Questions for session in groups

1. Do you recognize the results of the Quick Scan and what are your comments?
2. Which topics can be determined for Geodata use in South Africa to bridge the last mile?
3. What are the biggest challenges?
4. What are major threats?



World cafe

- what's in it for me and you
- matching/partnering/service within G4AW
- target smallholder- bridging the last mile

Table 1 Mr Piada Landmapping

Quality of data;soil feasibility-yield prediction

Table 2 Mr. Angels Farm/Crop management

Irrigation-Water

Table 3 Mr Adri Risk management

Weather insurance/early warning