



# KNOWLEDGE AND EXPERIENCE SHARING SYMPOSIUM

## Towards Highly Rewarding and Inclusive Flood-based Livelihoods

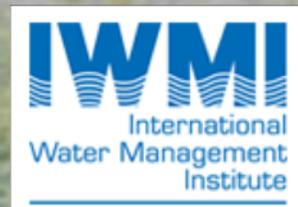
### SMART technologies and good practices – impacts, examples and upscaling approaches

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VOI WILDLIFE LODGE, TAITA TAVETA COUNTY, KENYA



# Outline of discussion topics

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- ❖ What is smart
- ❖ Scope
- ❖ Resource materials
- ❖ Context: bigger goals
- ❖ The impact
- ❖ Some examples
- ❖ Upscaling approaches and their effectiveness



## What is SMART?

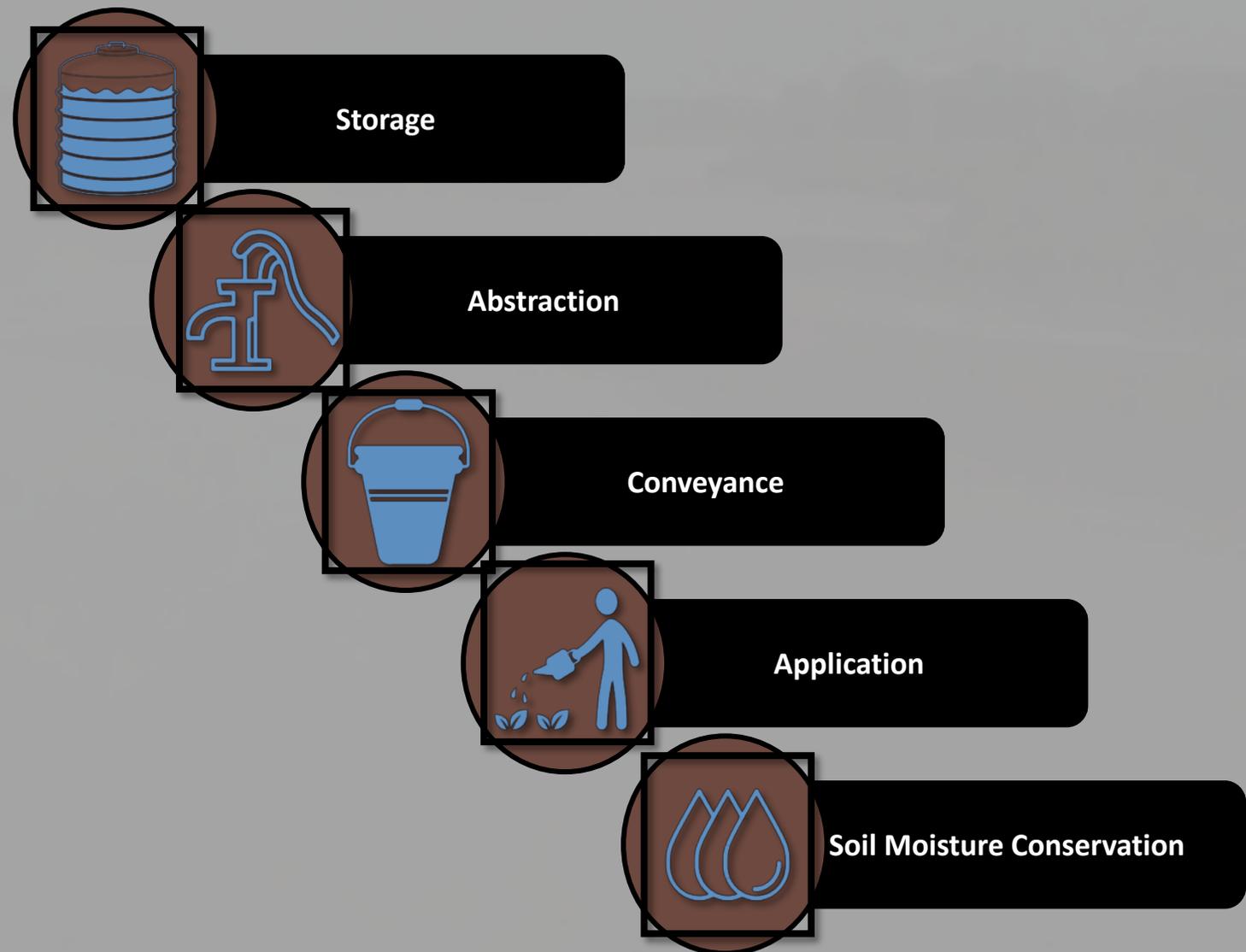
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- S** Simple (as simple as possible)
- M** Market readily available/can be locally provided
- A** Attractive and affordable
- R** Repairable
- T** Technically feasible *for small and medium scale farmers*



# Scope

- ❖ Agricultural value chain from land preparation to harvest and post harvest storage
- ❖ Irrigation Spectrum
- ❖ Improved agricultural extension



## Resource material

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- ❖ Scaling strategy for the smart water for agriculture project in Kenya (a soft copy will be shared on request)
- ❖ Evidence-based documentation by the Flood-based Livelihood Network Foundation and partners: an activity that is on-going (<http://spate-irrigation.org/wp-content/uploads/2018/03/SMART-technologies-for-improved-livelihoods-and-environmental-management.pdf>)
- ❖ 25% water productivity improvement in practice project ([http://www.thewaterchannel.tv/index.php?option=com\\_search&view=search&searchword=water%20productivity](http://www.thewaterchannel.tv/index.php?option=com_search&view=search&searchword=water%20productivity))



## Context, the bigger goals

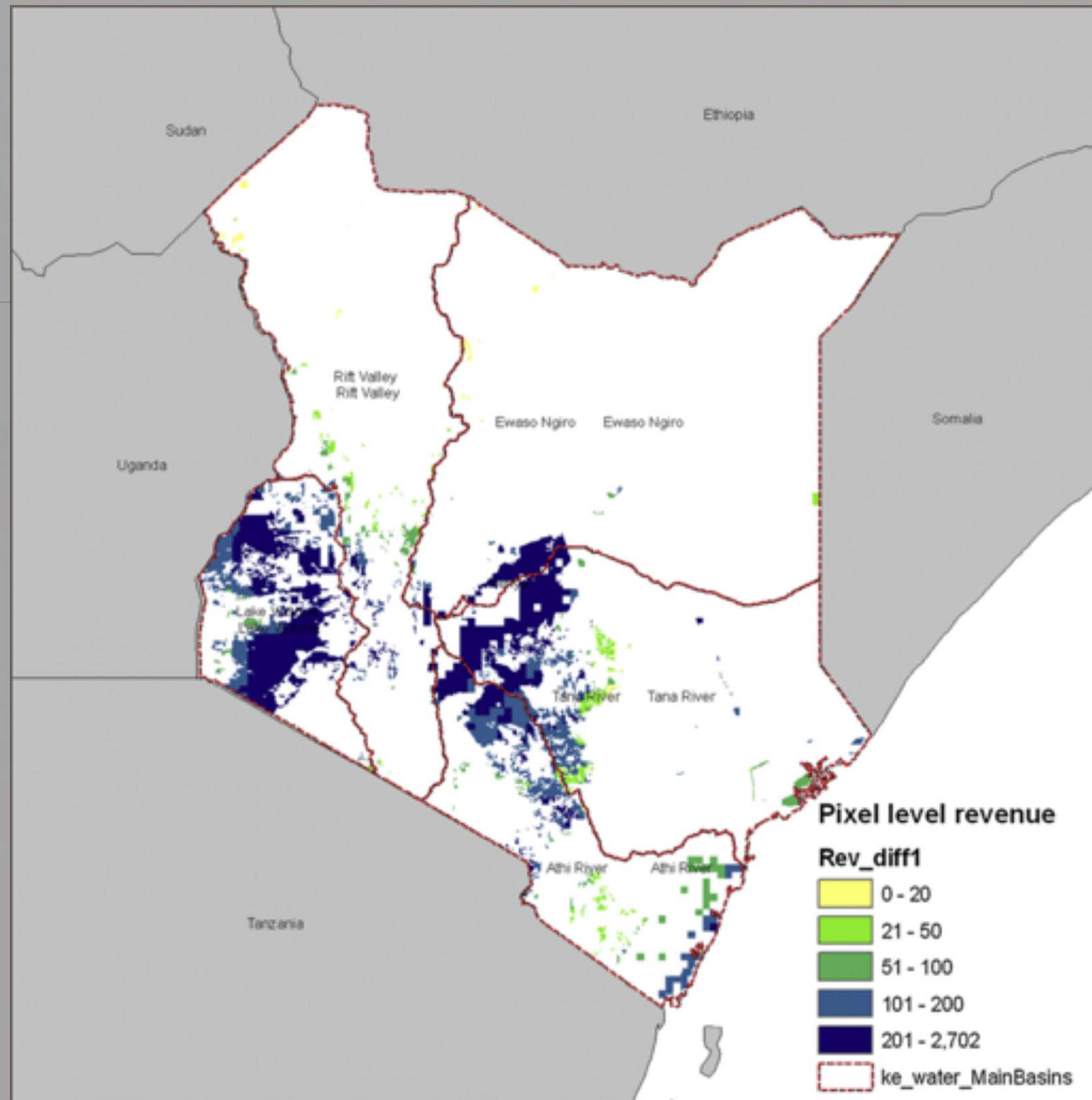
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- 1. Inclusiveness:** Being less laborious and time consuming, yet **highly rewarding**, smart technologies turn agriculture into a sector with many opportunities:
  - ❖ Gainful dignified employment for many, including young men and women
  - ❖ Decent living standard for the diverse rural families, including young men and women
  - ❖ Competitive-edge for agri-businesses in national and regional markets.
- 2. Urban-rural migration:** If agriculture does not embrace smart technologies and practices, we may expect exodus of people from rural areas to continue.
- 3. Limited room for expansion:** the obvious need to make do and make more from the existing resource base - 90% in food production from existing land and water



# The larger Impact

- ❖ Figure shows net revenue in USD/ha through efficient use of water (IFPRI, 2014)
- ❖ 100 USD/ha is very much achievable in arid and semi-arid regions where FBLS is practiced
- ❖ World wide FBLS potential: 25 million ha
- ❖ Kenya FBLS estimate: 400,000 ha

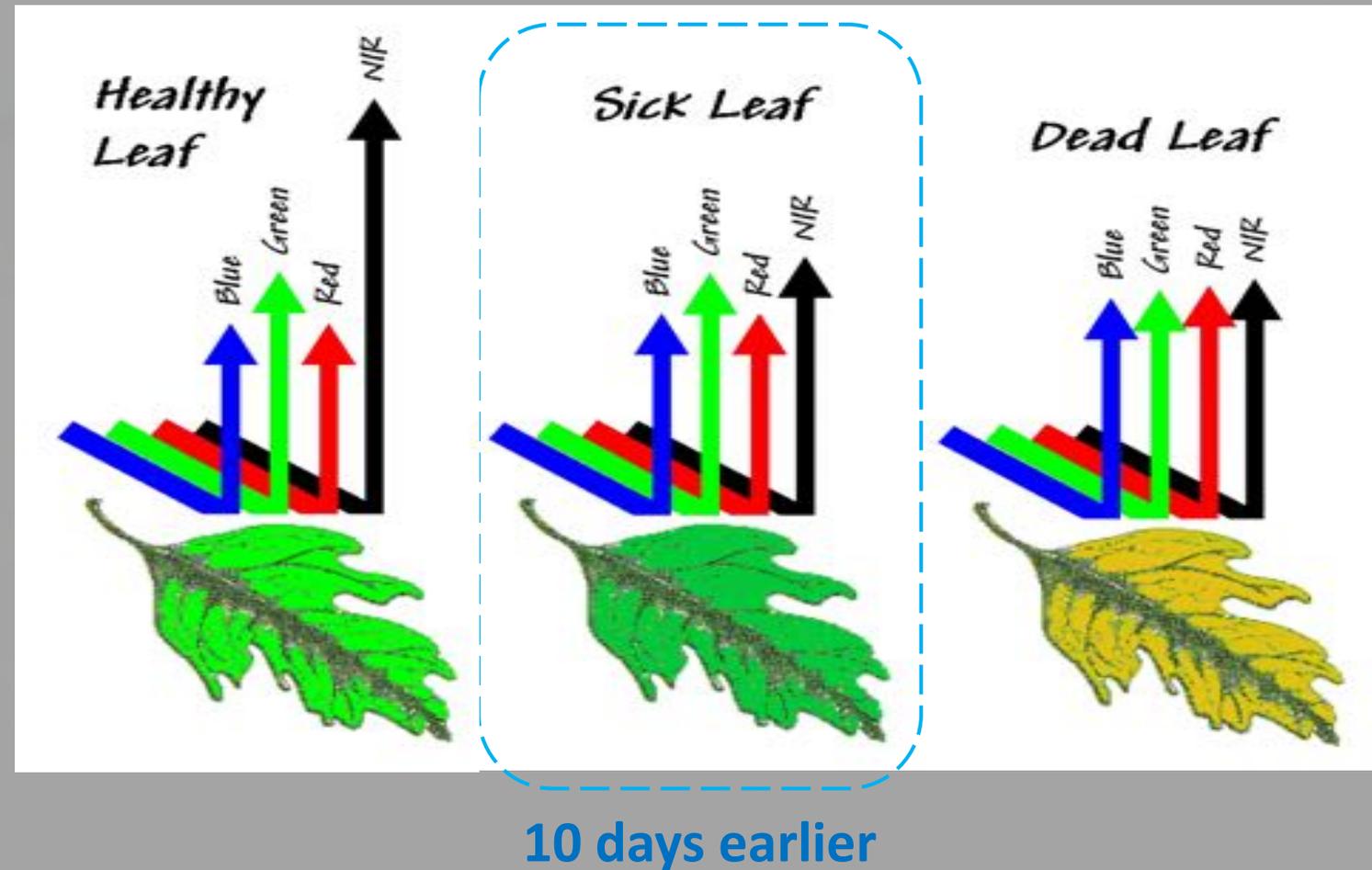
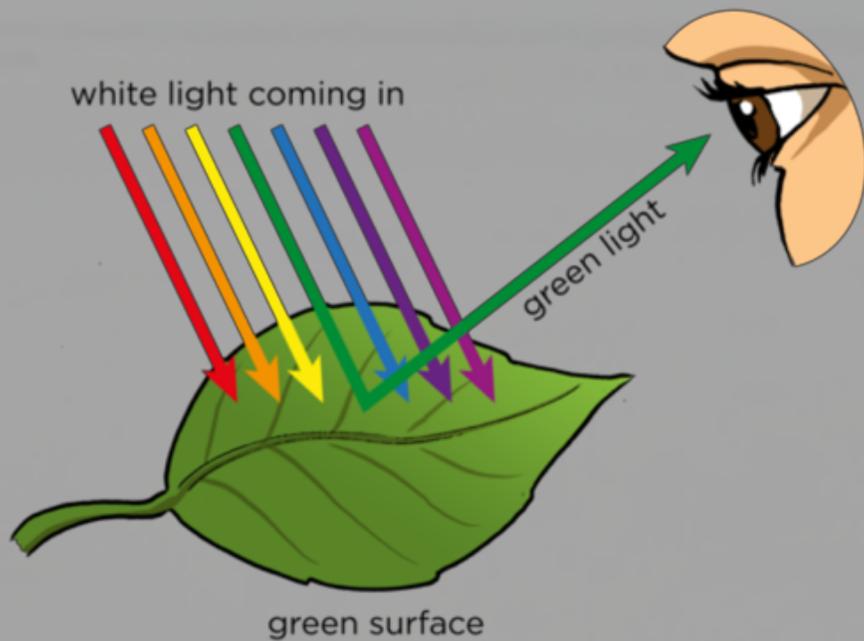




# ThirdEye: Flying Sensors to Support Farmers' Decision Making



# NDVI (Normalized Difference Vegetation Index)?



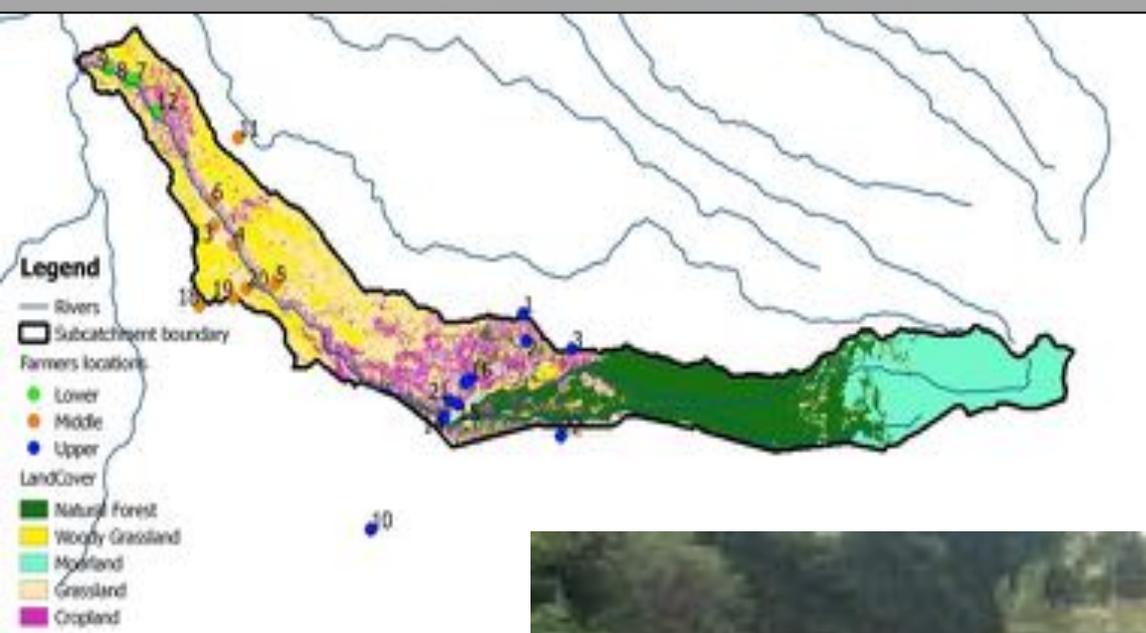
Healthy plant reflects more NIR and green light compared to other wavelengths, but it absorbs more red and blue light



# The larger impact: 26.5% WP increase (SWA, 2018)

Control water productivity (no ThirdEye intervention)	25.56 kg/ M <sup>3</sup>
ThirdEye farmers' water productivity	32.32 kg/ M <sup>3</sup>
Change in water productivity	6.76 kg/ M <sup>3</sup>
Change in water productivity	26.5%
Benefiting farming households	527
Benefiting individual farming family members	2477





Estimated 4000 farmers irrigate from Naromoro river in Laikipia county

Excessive pumping in mid and upstream section



Mr. Ephraim (farmer) and Ms. Marianne (MSc students from Wageningen University) witness a dry lower section bed of the Naromoru river.

# Raised and conventional farm ponds



## Ephraim farm production costs – fine beans

No	Item	Description	Units	Rate KES	Total KES
1	Land preparation	Ploughing	1/4	1600	1600
2	Seeds	Bed preparation 400gms unit	5	800	4000
3	Planting/weeding	Man-days	12	250	3000
4	Fertilizer	1 <sup>st</sup> and 2 <sup>nd</sup> application	80kg	50	4000
5	Chemical	Fungicides	2kg	800	1600
6	Chemicals	Pesticides	200 ml	4	800
7	Harvesting	Man-days	16	250	4000
8	Transport	motorbike	8trips	200	1600
<b>Total Production cost</b>					<b>20,600</b>

### Total sales and net income

Production: 1000 kg  
 Price per kg: 80 KES  
 Total sales: 80,000  
 KES

**Net income: 80,000  
 – 20,600 = 59,400**

## Ephraim farm: February to September net income in KES

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1. Fine beans: 59, 400
2. Tomato: 171, 250
3. Carrot: 211, 750
4. Pumpkin: 186, 900

**Total net income: 629,300**

**Contact: Ephraim Kahenya**

**Tel: +254 724-636-059**

The significant income contributed to acceleration of uptake of SMART technologies by other farmers. 30 farmers (including 6 young farmers) in the neighborhood of Ephraim adopted similar technologies as a direct result of his success in the February to September crop production season.



# Our last field trip stop yesterday, 6 March





## Tree puller

- ❖ Uproots small trees and shrubs
- ❖ Less energy and time as compared to manual uprooting
- ❖ Can be locally produced
- ❖ How does it work?

<http://www.thewaterchannel.tv/media-gallery/6388-the-tree-puller>



## Improved harvesting tool: SCYTHER

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- ❖ Harvests crops and grasses
- ❖ Sharp, high quality blade
- ❖ Light weight, 4 times faster than normal sickle
- ❖ Saves labour and time
- ❖ Successfully tested in Asia

<http://www.thewaterchannel.tv/media-gallery/6370-scythe-project-in-india-2016>



## Fodder chopper for better livestock feed

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- ❖ Hand or motor driven machine to chop grasses for livestock
- ❖ Easy to maintain and operate
- ❖ Adjustable for dry and fresh fodder
- ❖ Saves time and energy as compared to manual cutting



<http://www.thewaterchannel.tv/media-gallery/3836-rural-technologies-fodder-chopping-machine>





## Suitable for smallholder Flood-based agriculture

- ❖ Light, can be fitted with metal paddle and is suitable for wet conditions
- ❖ Early ploughing = less soil moisture loss, limited damage to soil structure
- ❖ Several benefits beyond ploughing: water pumping, fodder cutting, towing trailer

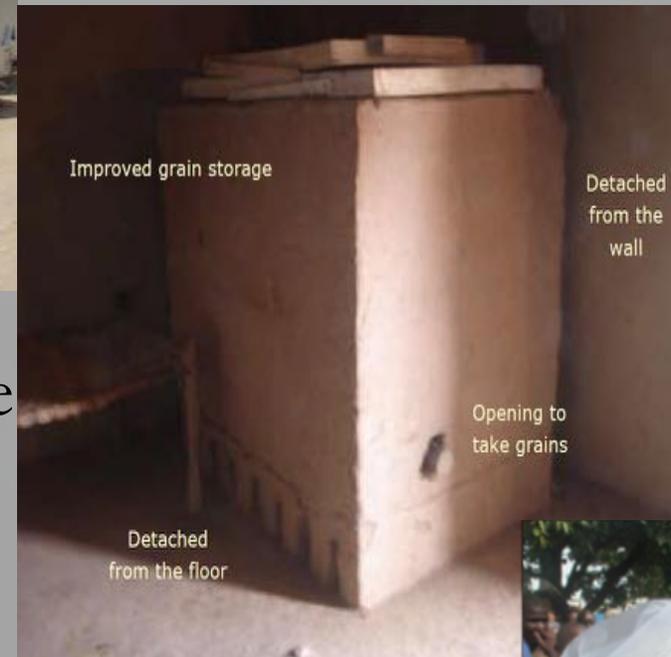
Single Axe Tractor – Ploughing and beyond

- ***GREENTREE - Agricultural Consulting and Equipment Supply***
- *Email: Mobile Kenya: +254 (0)700 719675 - (0)722 444420 , e-mail: [gtagconsult@gmail.com](mailto:gtagconsult@gmail.com)*

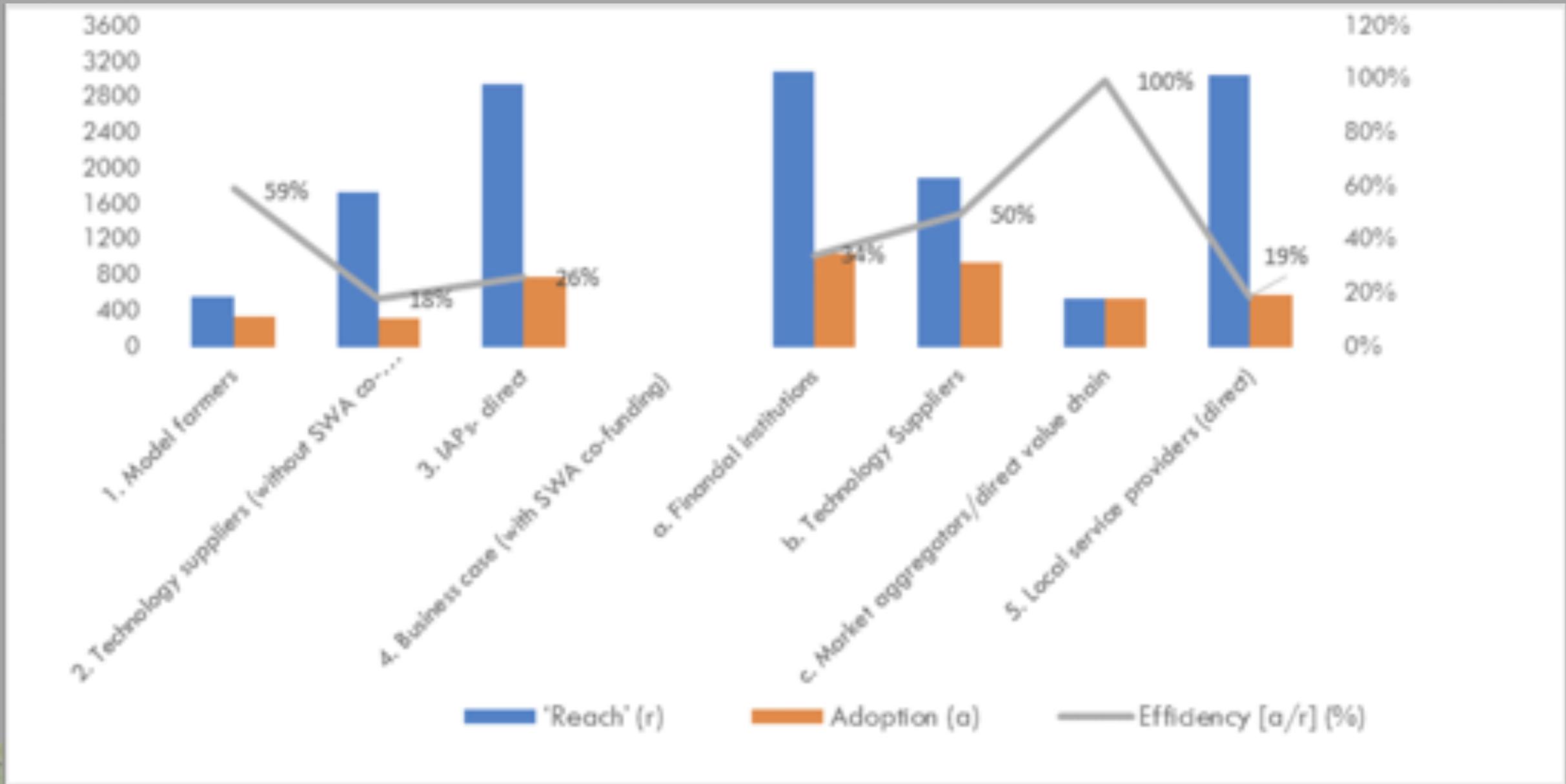


## Improved post harvest storage

- ❖ Improved storage is important: storage losses can be as high as 6-20%
- ❖ Main reasons:
  - ❖ Insects/pests
  - ❖ Seeds stored before complete drying
  - ❖ Moisture storage conditions



# Upscaling pathways (SWA project)



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Thank you so much

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QUESTIONS ARE WELCOME

