

REDD AND SUSTAINABLE AGRICULTURAL INTENSIFICATION: AN ANALYSIS OF TRADEOFFS AND SYNERGIES AT A REDD PILOT PROJECT IN KILOSA DISTRICT, TANZANIA

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RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



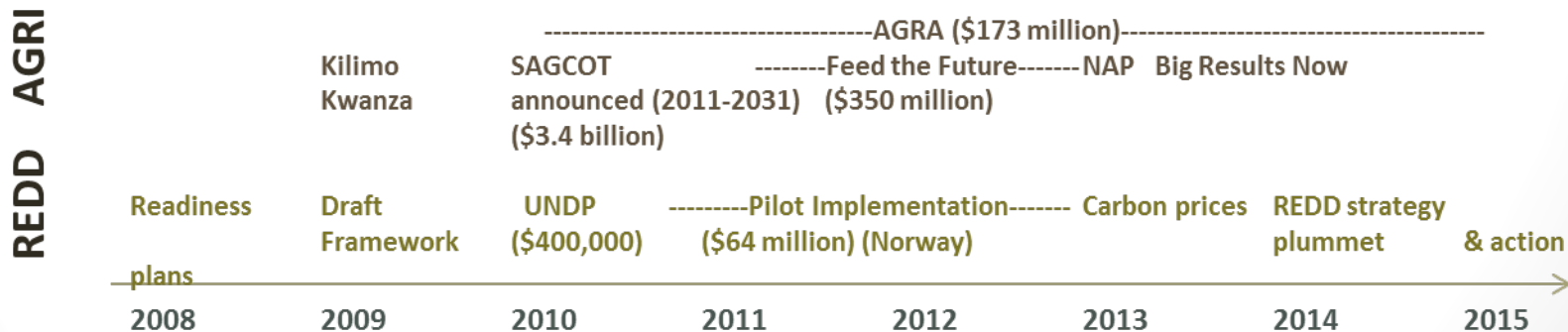
Introduction

- Tanzania was one of nine recipient countries of Norway's International Climate and Forest Initiative (NICFI) to pilot REDD.
 - Nine projects were piloted
- As REDD pilots got underway, addressing deforestation drivers became problematic.
- Agriculture is the TZ's biggest deforestation driver, followed by charcoal.

- Tanzania is also host to several other high profile donor initiatives such as USAID's Feed the Future (FtF), Alliance for a Green Revolution in Africa (AGRA), Power Africa and others.

Shifting Development: From Forest Conservation to Food Security

- Comprehensive Agriculture Development Programme – commits African governments to raise agricultural productivity by 6% and allocate 10% of budget to agriculture sector
- Strengthened role of private sector to bring about a green revolution and commercialization of agriculture.
- TZ initiatives that followed (maize, rice and sugar)
- Original focus on large-scale commercial agriculture, somewhat of a shift to medium sized farms and then outgrower schemes with central processor.



TZ Forest Service - Revenue ~\$1.2million/yr

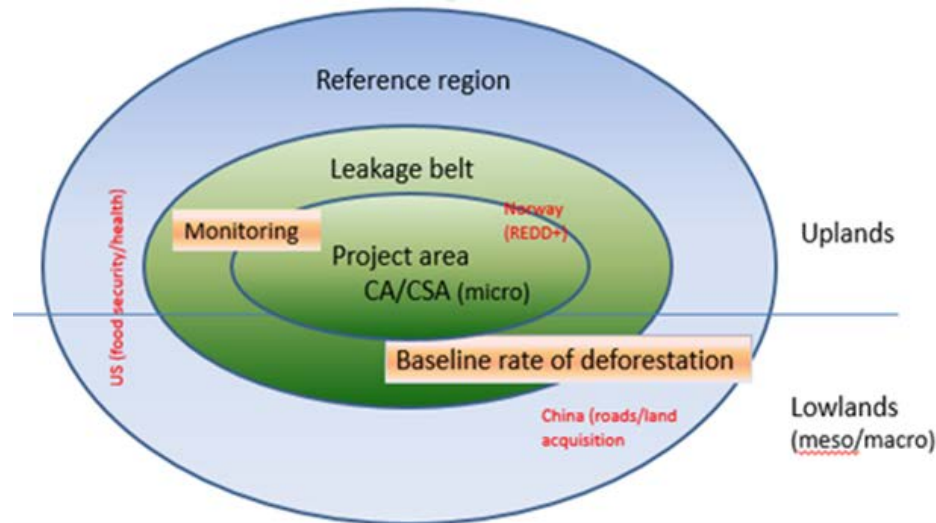
Agriculture, Forests & Scale

Analysis of Scale:

- 1) Household (HH) / Village,
- 2) Landscape (leakage belt, reference region, watershed)

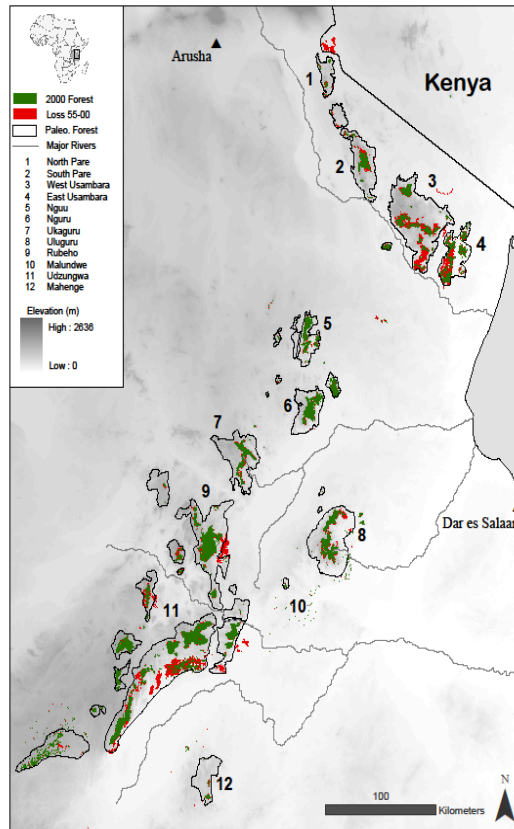
Questions:

- 1) How effective is REDD in addressing agriculture as a deforestation driver within project areas?
- 2) What other agriculture related and/or anthropogenic forces influence deforestation?
- 3) How does deforestation impact ecosystem services needed by agriculture, in particular irrigation for large-scale commercial agriculture?



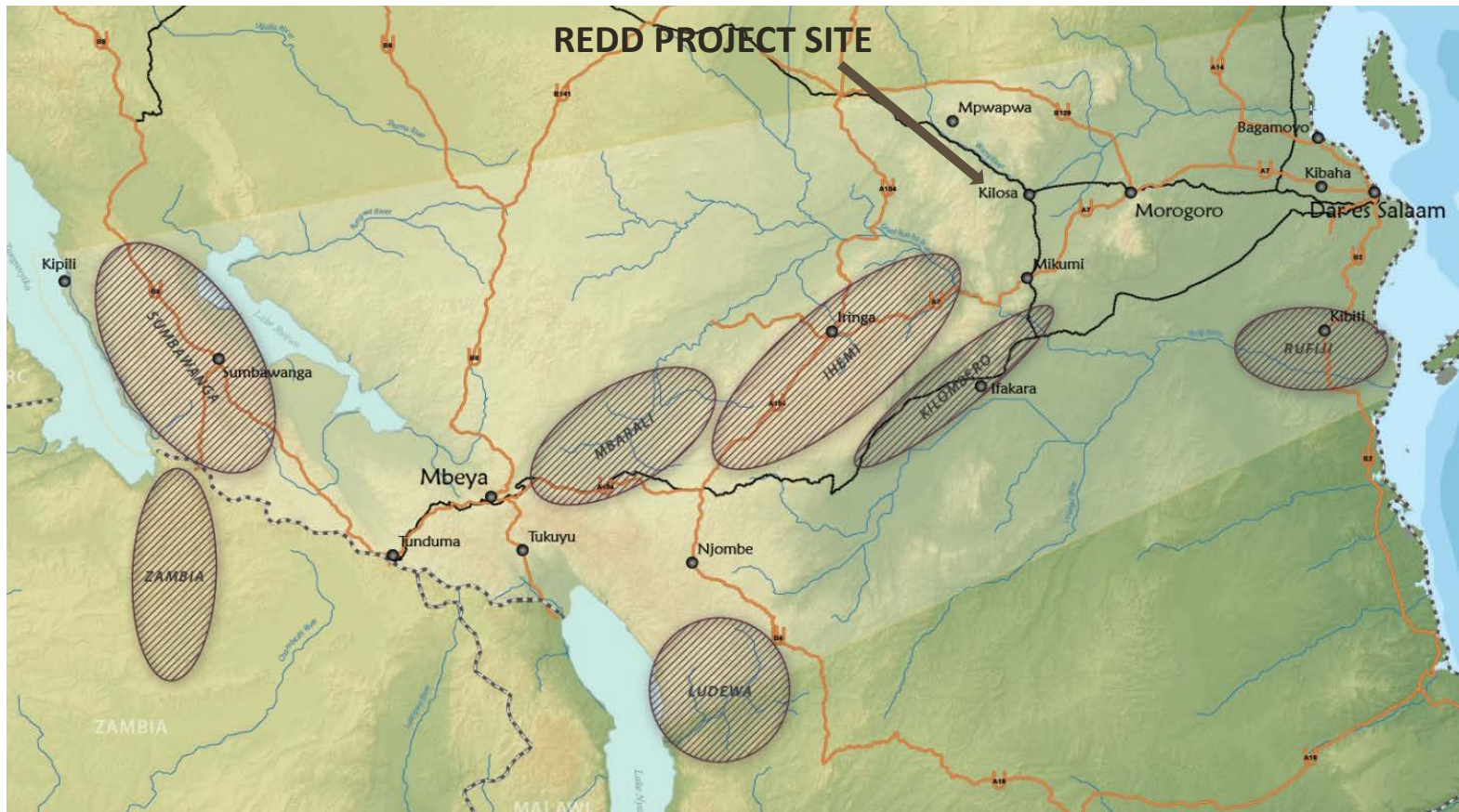
Project Background and Study Site

- **Implementer:** Tanzanian Forest Conservation Group (TFCG) / MJUMITA
- **Study site:** Kilosa District, Ukaguru and Rubeho Mountains (part of Eastern Arc Mountains)
 - **Pre-colonial Era:** Kilosa home to slave caravan route. Early settlers in mountains were escaped slaves.
 - **Colonial Era:** Kilosa District valley bottoms >20,000ha sisal, 13,600ha maize to feed sisal plantation workers.



Source: Hall, J. (2009) Forest in the year 2000, forest lost since 1955 and the paleoecological estimation of forest extent.

Southern Agriculture Growth Corridor of Tanzania (SAGCOT)



Project Intervention: From Extensive to Intensive Agriculture

- Land use planning demarcated village forest reserves & areas for ag. dev.
- Villages enacted rules that capped newly established agri land at 2 acres.
- **Phase I:** Farmers trained in conservation agriculture (CA)
- **Phase II:** Climate-smart agriculture (CSA)
- When carbon price dropped, TFCG supplemented REDD in some villages with sustainable charcoal production.
- Conservation Agriculture
 - Minimal soil disturbance: planting basins
 - Soil cover: mulching crop residues & cover crops
 - Crop rotation



Methods

Household and village

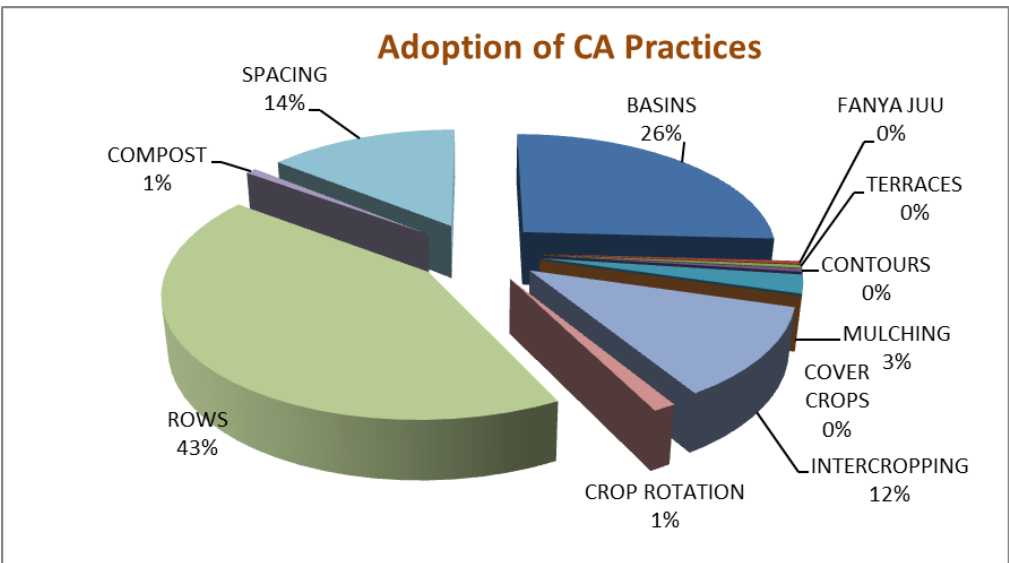
- Survey of 419 HH (5 project, 3 control villages)
 - Farm plot characteristics, adoption, perception of trends and benefits/losses, food security/dietary diversity.
 - Regression model of adoption rates of improved agricultural practices
- Key informant interviews

Landscape

- Change detection analysis (2007 – 2015)
- Qualitative deforestation analysis of deforested plots in project areas and leakage belt
- Key informant interviews
- Hydrologic flow data.

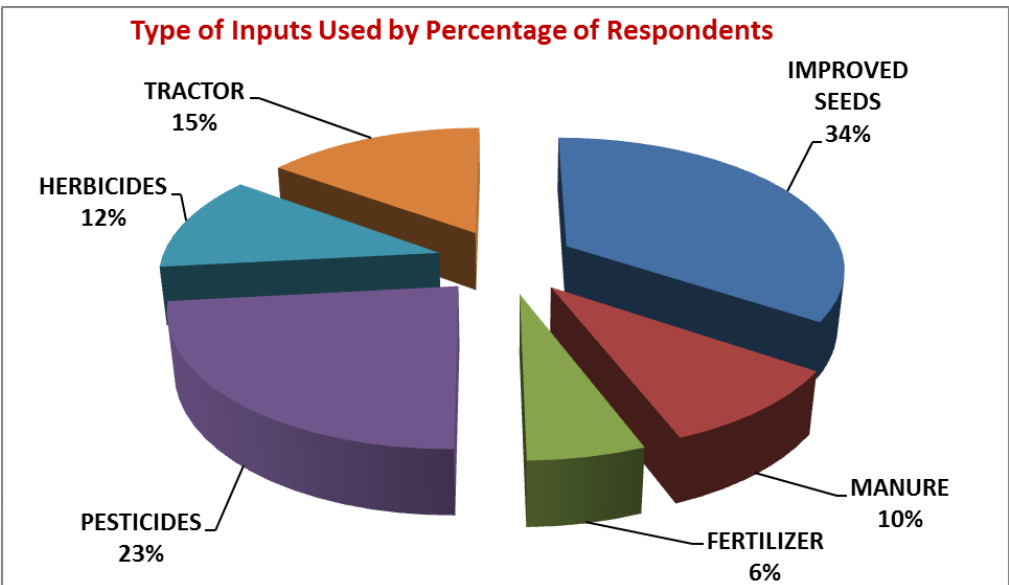
Question #1: How effective is REDD in addressing agriculture as a deforestation driver within project areas ?

Adoption of Practices & Inputs in Project Village



Top three practices adopted

- Planting in rows
- Spacing
- Basins (very labour intensive): Post-REDD era: use of basins ceases



Top Inputs used

- Improved seeds (34%)
- Pesticides (23%)
- Tractor (15%)
- Herbicides (12%)

Agrochemical use increased due to intervention strategy. (Herbicides not introduced by project.)

Question #1: How effective is REDD in addressing agriculture as a deforestation driver within project areas ?

What Influences Adoption of Conservation Agriculture/Climate-Smart Agriculture (CA/CSA) Practices?

Variables with the most influence on adoption of CA/CSA on a REDD landscape:

- Zoning tracts of forest as agriculture (-),
- The amount of a REDD payment (+),
- Land fragmentation (-),
- Location of village i.e. lowland, mid-montane, upper montane (+/-),
- Perception of project benefits (+).

These variables had more influence than typical adoption ones such as education level, number in household and distance to markets, which were also included in the model.

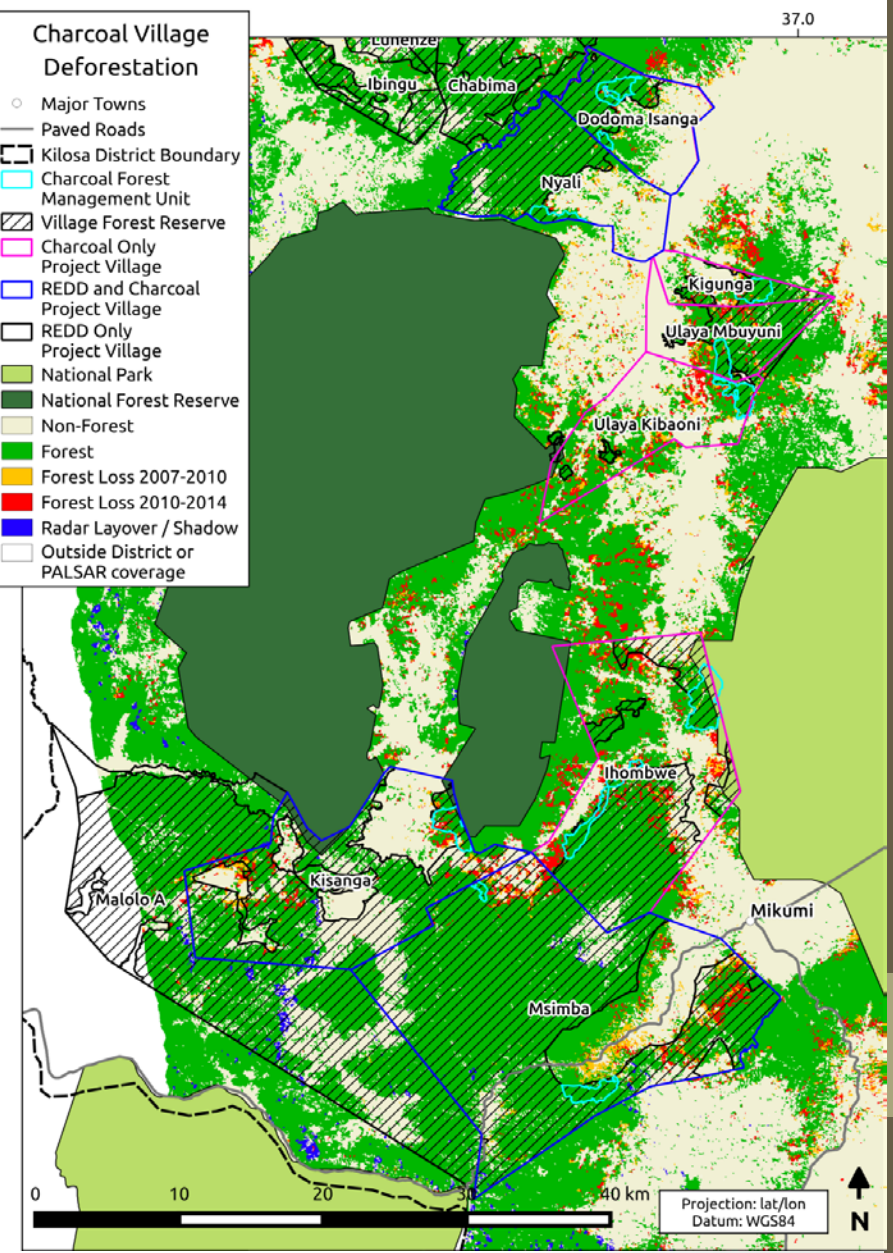
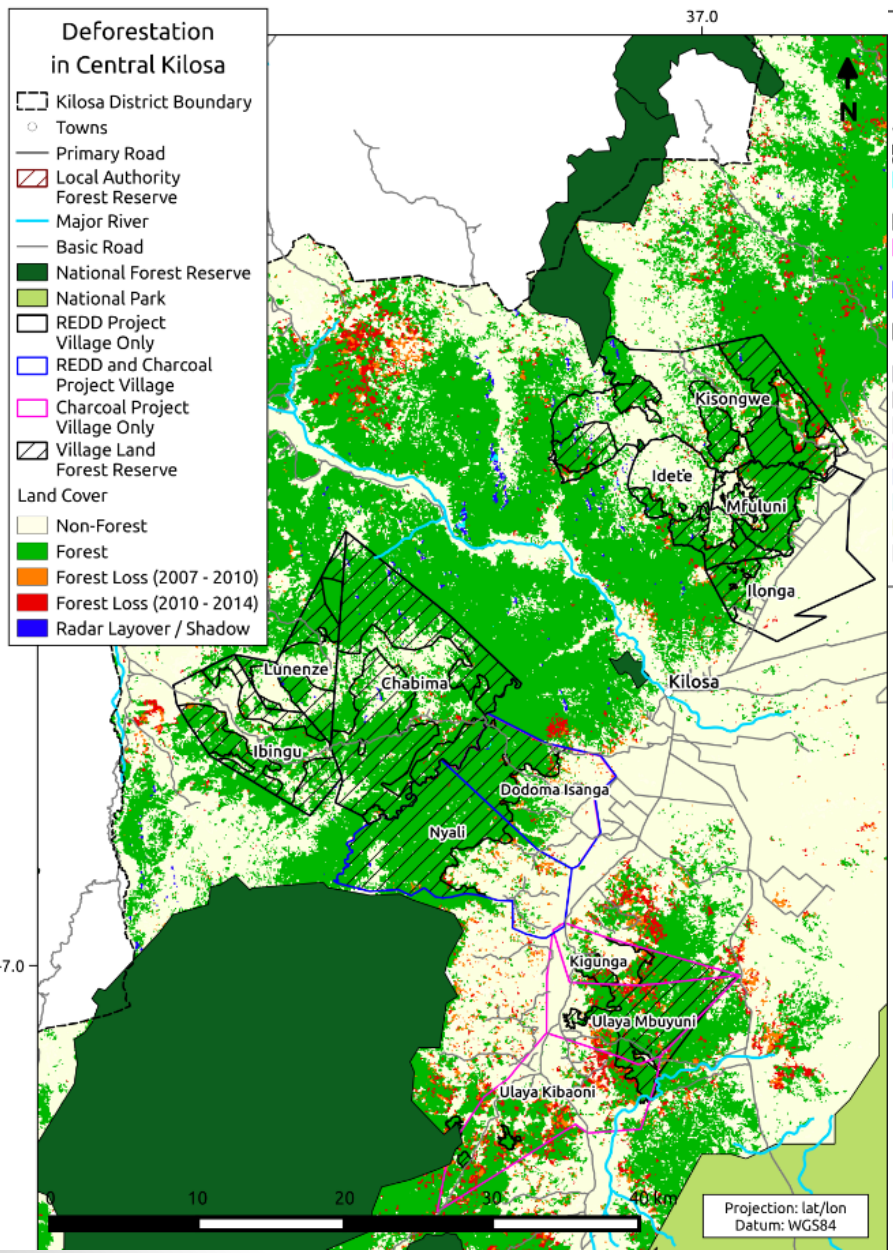
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Lessons Learned

- ***REDD has a role to play in rapidly transitioning farmers from extensive to intensive agriculture.***
 - In the absence of REDD payments, a plausible substitute is a sustained connection of farmers to markets.
 - Possible 'roundtable for smallholders' similar to soy and palm oil needed
- ***Land use planning*** is important. Zoning forests as agriculture – *because villages are planning for future agricultural needs, just as some Central African countries have argued* – pulls adoption rates in the opposite direction.
- ***Induced land scarcity*** from zoning placing as much forest as possible in village forest reserves is necessary if adoption rates are to rise.
- At HH/village level, ***agricultural practices*** that conserve soils need to be ***connected to markets***
 - Yields increased but practices that improve soil health (and control erosion) not adopted
 - Overreliance on a technical package is unsustainable

Question #2: What other agriculture related or anthropogenic forces influence deforestation?

Deforestation Analysis: Village & Landscape



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Deforestation & Change Detection Analysis

Annual rate of deforestation in PROJECT villages (2010-2014)

Declined by 22%, a modest success

- the majority of deforestation occurs within forests zoned as agriculture
 - expansion of existing farms, clearing of mature fallows, some in-migration.
- 50% of illegal deforestation in Village Forest Reserves (VFRs) from in-migration: livelihood pressure, charcoal making, soil fertility and avoiding drought.
 - 56% were landless

Annual rate of deforestation in NON PROJECT villages

Increased by 32%

- Deforestation in leakage belt due to in-migration (including Sukuma), flood refugees who refuse to return home, illegal charcoal and logging
- Leakage from REDD not occurring

Question #2: What other agriculture related or anthropogenic forces influence deforestation?

Deforestation & Change Detection Analysis

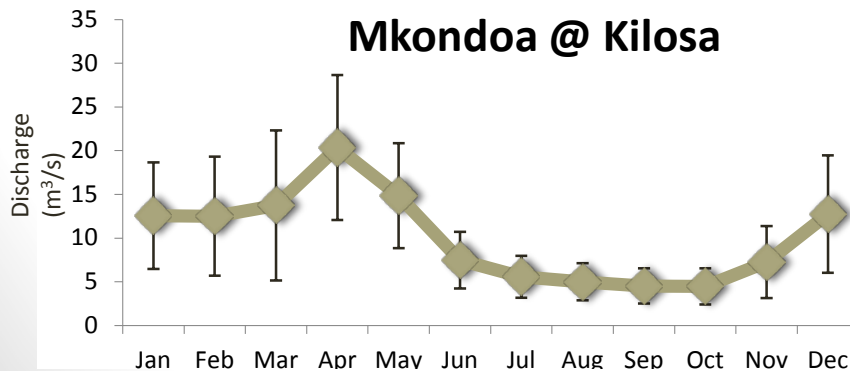
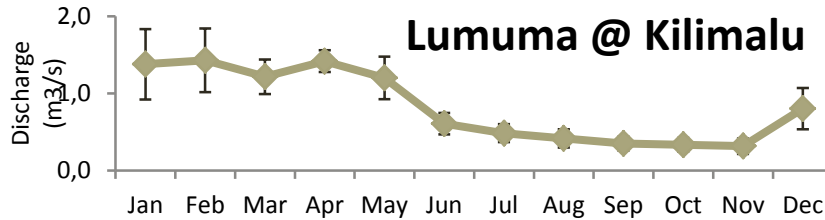
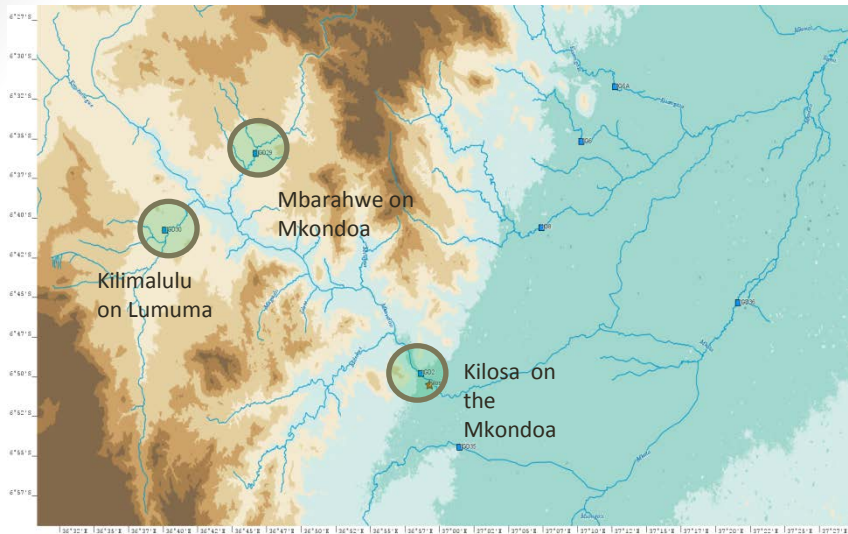
- **Lessons learned**

- ***People are migrating*** from dry, degraded areas in search of more fertile lands
- ***Village governments*** are not doing a good job of directing people to areas zoned as agriculture
- When land is scarce, or in this case, ownership of large tracts of land is concentrated and slated for large-scale commercial agr, ***people move into and clear forests to obtain access to land.***

Question #3: How does deforestation impact ecosystem services needed by agriculture, in particular irrigation for large-scale commercial agriculture?



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- Steams and springs increasingly ephemeral or absent during dry season,
- Increased instantaneous/higher velocity peak flows (sometimes results in flooding),
- Sedimentation in reservoirs,
- Decreased canopy interception and underground infiltration leading to lower groundwater recharge and falling water table.
- ***Less water for irrigation particularly in dry season***

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What kind of intensive agriculture in bottom lands?

- Few large-scale commercial growers and concentrated land ownership that ***doesn't attract in-migration?***
- OR smaller-scale commercial outgrowers ***that facilitates in-migration?***
- Migration is a significant factor in deforestation
 - Where to accommodate newly arrived people?
- REDD or PES scheme must cover entire or most of mountain block to provide ecosystem services needed for irrigation for lowland commercial agriculture.
- In Tanzania, 'REDD is dead' largely due to low carbon prices.
- In countries where food security is higher priority than forest conservation, ecosystem services from avoided deforestation that improve water supplies for agricultural development might be more politically palatable than carbon sequestration and offsetting for countries/industries in far away places.
- Currently, the agricultural sector does not recognize its need for intact forests.