Agroforestry: A Means for Green water Harvesting on Smallholder farms

Curriculum Workshop, Sudan.

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Outline

- Definition of AF and Benefits
- Types of AF in practice
- Some of the works we do in AF
- Opportunities for learning and scaling AF
- Conclusion?
Definitions

- **Agroforestry** is a collective name for land use systems and practices in which woody perennials are deliberately integrated with crops and/or animals on the same land management unit. (ICRAF)

- **Water harvesting** is the collection and concentration of rainfall runoff for productive purposes (WHaTeR)
Agroforestry is an effective means for harvesting Productive Green water on Smallholder Farmlands and Flood zones. What are the available technological options?

Benefits of Agroforestry

- Source of energy/wood fuel/medicinal plants.
- Source of food for human (fruits) and animals (fodder).
- Greater diversity of income sources (pollen, nectar etc.)
- They improve soil fertility
- Buffer crop production from drought stress
  - Sustain higher and more stable yields by more favorable microclimate
  - Conserve and enhance soil organic matter, infiltration and water holding capacity
  - Soil protection and conservation
- The trees provide raw materials to industries including construction
- Trees on the farm saves on labour used by women and children in collecting firewood
## Agriculture with trees (agroforestry)

<table>
<thead>
<tr>
<th>Production system</th>
<th>Tree species</th>
<th>Density Number/ha</th>
<th>Wood Use period (yrs)</th>
<th>Use period TFS</th>
<th>Production cycle (yrs)</th>
<th>Traditiona kiln (10%)</th>
<th>Improved kiln (30%)</th>
<th>Income from firewood (US$/ha)</th>
<th>Income from charcoal (Kiln10%) (US$/ha)</th>
<th>Income from charcoal (Kiln30%) (US$/ha)</th>
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<tbody>
<tr>
<td><strong>Boundary</strong></td>
<td>Acacia polyacantha</td>
<td>2500</td>
<td>4.41</td>
<td>3.5</td>
<td>2.4</td>
<td>3-5</td>
<td>0.441</td>
<td>1.323</td>
<td>233.73</td>
<td>48.51</td>
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<tr>
<td></td>
<td>Grevillea robusta</td>
<td>2500</td>
<td>2.64</td>
<td>2.1</td>
<td>1.4</td>
<td>3-5</td>
<td>0.264</td>
<td>0.792</td>
<td>139.92</td>
<td>29.04</td>
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<tr>
<td></td>
<td>Melia azadirachta</td>
<td>625</td>
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<td>0.7</td>
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<td>3-5</td>
<td>0.084</td>
<td>0.252</td>
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<td><strong>Woodlots</strong></td>
<td>Grevillea robusta</td>
<td>1111</td>
<td>0.46</td>
<td>0.4</td>
<td>0.3</td>
<td>3-5</td>
<td>0.046</td>
<td>0.138</td>
<td>24.38</td>
<td>5.06</td>
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<tr>
<td></td>
<td>Gliricidia sepium</td>
<td>5000</td>
<td>2.08</td>
<td>1.6</td>
<td>1.1</td>
<td>2</td>
<td>0.208</td>
<td>0.624</td>
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<td><strong>Shelterbelt</strong></td>
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<tr>
<td><strong>Intercropping</strong></td>
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<td>0.7</td>
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<td>0.134</td>
<td>0.402</td>
<td>71.02</td>
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<tr>
<td><strong>Miambo woodlands</strong></td>
<td>Mix of native species</td>
<td>35</td>
<td>24</td>
<td>3.5</td>
<td>10.5</td>
<td>1855</td>
<td>385</td>
<td>1155</td>
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<tr>
<td><strong>Plantation</strong></td>
<td>Eucalyptus camadulensis</td>
<td>147-286</td>
<td>8</td>
<td>14.7-28.6</td>
<td>44.1-85.8</td>
<td>7791-15,158</td>
<td>1617-3146</td>
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</table>

Tanzania ICRAF; Kimaro et al., 2012. Supported by DFID.

KEFRI, Western Kenya. Oduor et al., 2012.
Agroforestry practices: Tree intercropped with field crops

1. *Gliricidia sepium*-Intercropping

- A fast-growing shrub and establishes well on acidic, degraded and infertile soils.
- An excellent biomass producer (both wood and leaf).
- An excellent soil improver, nitrogen fixer and recycler of nutrients.
- Tolerate repeated cuttings and has high shoot regrowth.

2. *Faidherbia albida* intercrop

A dryland tree species.

*Faidherbia albida* in Zambia

Source: Dennis Garrity, ICRAF

Long-term maize yield without fertilizer in a Gliricidia intercrop

Source: Dennis Garrity, ICRAF
**Faidherbia Trial Results in Zambia**

*Maize yield - zero fertiliser*

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
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<tr>
<td>With Faidherbia</td>
<td>4.1</td>
<td>5.1</td>
<td>5.6</td>
</tr>
<tr>
<td>Without Faidherbia</td>
<td>1.3</td>
<td>2.6</td>
<td>2.6</td>
</tr>
</tbody>
</table>

Number of trials: 15, 40, 40

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10mx10m spacing
Farmer Managed Natural Regeneration (FMNR)

Initial stages

Other Benefits
1. Biodiversity improvement
2. Climate change adaptation and mitigation

Fuelwood
Good forage
Improved soil fertility/crop yield
Regreening Africa project

- Aim at reversing land degradation by bringing trees back on landscape
- Targets: 500,000 households and 1 million ha of land
- Sites: Implementation is underway in 8 countries of Africa namely Kenya, Somalia, Rwanda, Ethiopia, Mali, Niger, Ghana and Senegal
- Project period: it is a 5-years project (2017-2022)
- [http://landscapeportal.org/layers/geonode%3Aec_eva_project_sites](http://landscapeportal.org/layers/geonode%3Aec_eva_project_sites)
Opportunities to realize synergies within Africa’s landscapes

Afr100 Africa restoring 100 million hectares of deforested and degraded land by 2030

African nations are committed to restore 100 million ha of land with trees by 2030.

Launched in 2015 at the Global Landscapes Forum in Paris as a country-led effort among African nations.

Today, 27 countries have committed to restore 111 million ha-11% more than AFR100’s restoration target.

Source: WRI
Potential Impacts of Agroforestry

- Reducing poverty through increased production of agroforestry products for home consumption and sale

- Contributing to food security by restoring farm soil fertility for food crops and production of fruits, nuts and edible oils

- Reducing deforestation and pressure on woodlands by providing fuel wood grown on farms

Potential Impacts continued

- Increasing diversity of on-farm tree crops and tree cover to buffer farmers against the effects of global climate change

- Improving nutrition to lessen the impacts of hunger and chronic illness associated with HIV/AIDS

- Augmenting accessibility to medicinal trees, the main source of medication for 80% of Africa's population

CONCLUSION

Land degradation in Africa is a serious concern and thus:

Needs of national agroforestry food-energy security programme

Success will require a broad-based national movement for land regeneration and food security

And it will require cross-sectoral coordination and goodwill with an ‘All-In’ spirit of collaboration.
THANK YOU