Conservation Agriculture through Agroforestry in the context of environmental change

Achieving an Evergreen Revolution

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Key Points

1. Radical agroforestry innovations needed for CA to succeed on smallholdings in the tropics

2. Targeting CA through improved soils data

3. Community Landcare to accelerate adoption

4. The global climate change agenda – from REDD to AFoLU
Fertilizer tree intercropping sustains higher crop yields in sub-Saharan Africa
Achieving Serious Impact
Southern Africa

Number of farmers benefiting from agroforestry

- 30,000
- 5
- 10
- 200
- 1,000
- 3,500
- 80,000
- 110,000
- 180,000
- 400,000

Year:
- 1988
- 1990
- 1992
- 1994
- 1996
- 1998
- 2000
- 2002
- 2004
- 2006
- 2008
Conservation Agriculture *with Faidherbia albida*

60 years of research shows on each hectare, mature trees supply the equivalent of 300 kg of complete fertiliser and 250 kg of lime. This can sustain a maize yield of 4 tons/ha.

Faidherbia is indigenous in many African countries.
Faidherbia Fertilizer Trees at 100 trees per ha

A long term solution for maize production across East, Central and Southern Africa
## 2007/8 Faidherbia Trial Results

### Maize yield - zero fertiliser

<table>
<thead>
<tr>
<th></th>
<th>Tons/ha</th>
</tr>
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<tbody>
<tr>
<td>With Faidherbia</td>
<td>4.1</td>
</tr>
<tr>
<td>Without Faidherbia</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Data averaged from 15 trials
Hunger Hotspots superimposed on the farming systems with the most favorable potential for productivity increases. Source InterAcademy Council (2004).
What would be the impact if African farmers deployed fertilizer trees on a much larger scale?

If fertilizer trees were practiced on: 10 m ha

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Value of nitrogen fertilizers produced by farmers</td>
<td>$ 500 m/yr</td>
</tr>
<tr>
<td>Amount of additional maize produced</td>
<td>10 m tons</td>
</tr>
<tr>
<td>Value of additional maize produced</td>
<td>$ 1.6 billion</td>
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Over the course of four years farmers, extension services, planners, the private sector, policymakers and scientists will have freely available, web-enabled access to a globally integrated, evidence-based, and dynamic soil health information service that provides management, planning and policy-relevant soil information for the non-desert portions of Sub-Saharan Africa.

AfricaSoils.net
Background

There is a lack of coherent and rigorous sampling and assessment frameworks that enable comparison of research results across a wide range of environmental conditions ... and scales
Complexity and hierarchical nature of ecosystems requires a diversity of perspectives and scales to understand their dynamics.

Existing data and maps generally do not reflect soil (and landscape) functional properties.
The **Land Degradation Surveillance Framework**

Designed to provide:

- biophysical baselines at landscape level
- a monitoring and evaluation framework
Randomization of Sentinel Site locations stratified by climate
randomization to minimize local biases that might arise from convenience sampling
AfricaSoils.net sampling plot (1000 m²)

- with sub-plots (100 m²)
Near Infrared Spectroscopy for rapid soil characterization

- Rapid
- Reproducible
- Low cost
- Predicts functional soil properties
Examples from UNEP-ICRAF West Africa Drylands Project

Zebougou Sentinel Site
area = 10,000 ha
Areas with SOC$_{sat}$ deficits

Local (site-level) C$_{ref}$
Linking Sentinel Site Surveillance to Management Trials

Millet response to P application

$\text{SOC}_{\text{sat}} = 0.74$

$\text{SOC}_{\text{sat}} = 0.39$

PNT @ 100 kg ha$^{-1}$
Priority agroforestry intervention areas

Sokoura, Segou

- Dian
- Kono
- Moni
- Soko
- Zebo

Area (ha):

- ~3 trees ha⁻¹
- ~12 trees ha⁻¹
- ~5 trees ha⁻¹
- ~7 trees ha⁻¹
Australian Landcare – a national movement
...with global implications
International Landcare’s Guiding Values

1. **Partnerships** are key
2. **Voluntary** participation & local ownership
3. **Grass-roots** leadership with external support
4. **Flexibility** and adaptability
5. **Adds value** to existing groups and initiatives
6. **Inclusiveness**
7. **Non-political**
More than 600 Landcare groups

• Millions of fruit and timber tree seedlings were planted
• Thousands of farming families have adopted soil conservation technologies
LandCare South Africa is a community-based natural resource management programme.

Goals

- Optimum productivity and sustainability of natural resources.
- Food security
- Sustainable livelihoods
- Community empowerment and ownership
- Better quality of life for all
- Building partnerships
Landcare in Uganda
African Landcare Network
Supports vibrant landcare programmes across the continent
What are the universal aspects of Landcare?

- Voluntary community-based groups
- Focus on land regeneration and natural resource management for enhanced livelihoods
- Identify problems, mobilize knowledge and resources, influence policy
Reducing Emissions from All Land Uses

Current focus (2005 – present)
Reducing Emissions from Deforestation and Forest Degradation (REDD)

The Future
Reducing Emissions from All Land Uses -- Agriculture, Forestry and Land Use (AFoLU)
REALU Architecture: Reducing Emissions from All Land Uses

A possible vision of such approach:

Global architecture of efforts to reduce emissions from land use, based on fundamental principles and supporting the Millennium Development Goals.
Key Points

1. Radical agroforestry innovations needed for CA to succeed on smallholdings in the tropics

2. Targeting CA through improved soils data

3. Community Landcare can accelerate adoption

4. The global climate change agenda must move from REDD to embrace AFoLU
Continue the debate on the future of global land use: Make plans to participate in the 2nd World Congress of Agroforestry

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Nairobi

www.worldagroforestry.org/wca2009