Drivers of Deforestation and Land Use planning in Central Africa:

Agroforestry as a Land Use Planning Tool to Protect Forest in Central Africa

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Presentation outline

• World Agroforestry Perception of Land Use Systems,

• Key land uses in Central Africa,

• Drivers of deforestation (Direct and Indirect),

• Land Use Strategy to Protect Landscape,
  - Diversification via agroforestry: Principles,
  - Multifunctional agriculture and landscape,
ICRAF works to transform lives and landscapes with trees in the developing world, to improve food security, nutrition, income, health, shelter, energy resources and ensure sustainability of environment.
Some Common Land Use Options in Central Africa

- Primary/Secondary forests
- Rubber plantations
- Cocoa plantations
- Palm plantations
- Slash & Burn Agriculture
- Food crops
Drivers of deforestation

**Direct drivers**

1. **Agricultural expansion**
   - Shifting cultivation for food and cash crops
   - Expansion of annual crop systems in peri-urban area
   - Large-scale plantations like oil palm and rubber plantations

2. **Extraction**
   - Charcoal
   - Fuel wood

3. **Infrastructure**
   - Roads
   - Markets
   - Settlements

4. **Industry**
   - Mining

**Indirect drivers**

1. **Demographic factors**
   - Population increase

2. **Economic factors**
   - Poverty

3. **Technological factors**
   - More access to input for food and cash crops

4. **Institutional factors**
   - Agricultural policy

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How can we address these issues?
There is not a simple answer.

Need to simultaneously restore:

• **biological resources and natural capital** (soil fertility, water, forests, pest and disease control, etc.),

• **livelihoods** (nutrition, health, culture, equity, income),

• **Governance and institutional reforms** (set up hybrid institutions with all stakeholders to define a common vision & strategy for landscape management).
What Land Use Plan for the Landscape? ..1/3

Land Uses on the landscape

- Natural forest
- Lightly shaded monoculture
- Mixed farming system
- Monoculture

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What Land Use Plan for the Landscape? ..2/3
What Land Use Plan for the Landscape?..3/3
What Land Use Strategy to Protect the Forest?..1/4
What Land Use Strategy to Protect the Forest?..2/4
What Land Use Strategy to Protect the Forest?..3/4

Intensification

Ecological functioning

Profitability

Income stability

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What Land Use Strategy to Protect the Forest?..4/4

- Ecological functioning
- Income stability
- Agroforestry optimisation
- Profitability

Intensification

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Agroforestry is ‘A dynamic, ecologically based, natural resource management system that, through integration of trees on farms and in the agricultural landscape, diversifies and sustains production and builds social institutions’

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How to achieve diversification?

1. Empower small scale farmers to use high-value but long time neglected improved indigenous fruit trees

2. Develop and vulgarize the techniques of domestication of high-value indigenous fruit trees

3. Develop the marketing and the value chain of high-value indigenous fruit trees
Calliandra for fodder banks

Erosion control, contour bands

Inga edulis for soil fertility

Multiple Functions of Improved fallows
Agroforestry Products

Income, Livelihood, Environmental Services

- Fruits and nuts
- Fodder
- Timber, fuelwood
- Medicinal, gums, etc
- Fertilizer
- Combating diseases, industrial products
- Livestock
- Shade, energy
- Soil health & food security

Allanblackia

Varieties of fruits

Calliandra

Faidherbia albida

Prunus africana

Tectona grandis

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Tree Domestication

Simple vegetative propagation techniques:

• Rooting juvenile cuttings

• Grafting matured species

• Marcotting high-value species
Allanblackia floribunda

- Lauric
- Myristic
- Palmitic
- Stearic
- Oleic
- C18:2

Palm oil
Palm kernel
Rape oil
A young Allanblakia fruiting six years after planting
Creation of a cultivar

*Dacryodes edulis*

Earlier fruiting, smaller trees and uniform quality
Rehabilitation of old cocoa farms

Improved variety grafted to old cocoa tree

- Success rate 59-73 %
- Variation on growth
- Variation among clones

4 weeks after grafting
Effect of propagation methods on carbon storage potential in *D. edulis* trees of seed and vegetative origins

- *D. edulis* trees of vegetative origin produced significantly (P≤0.05) more biomass and carbon aboveground than trees of seed origin.

Biomass, carbon and CO₂e sequestrated aboveground in 10 years old *D. edulis* trees of seed and vegetative origins (mean ± s.e.d Mg ha⁻¹)

- *D. edulis* trees of vegetative origin produced significantly (P≤0.05) more biomass and carbon aboveground than trees of seed origin.

The right tree for the right place

1. Trees for Products
   - fruit
   - firewood
   - medicine
   - income
   - sawnwood
   - fodder

2. Trees for Services
   - soil fertility
   - carbon sequestration
   - soil erosion
   - watershed protection
   - shade
   - biodiversity
Multifunctionality of Agriculture & Landscapes
Conclusion

• The integrity of the rainforest in Central Africa needs to be secured,

• Diversification of **Food Crop Land Use Systems** with trees through **Agroforestry** could reduce the need for new forestland,

• Farmers are willing to manage **biodiverse multi-strata agricultural systems** if they are competitive,

• Rewards schemes for environmental services need to be realized,

• Need for hybrid institutions at local, national, and the global levels to continue being engaged.