A FARMER’S FRIEND

A GROWING GUIDE TO WEST AFRICA
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Creative Component, Summer 2008
What is the Purpose of *A Farmer’s Friend*?
AFRICA

- 3x the land area of the U.S.
- 53 Countries
- Population: ~752 Million.
- Perhaps a thousand distinct languages.
- Influenced by a combination of indigenous, colonial, and national ideas.
<table>
<thead>
<tr>
<th>Element</th>
<th>United States</th>
<th>West Africa</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land Area (km²)</td>
<td>9,161,923</td>
<td>6,061,410</td>
<td>-34%</td>
</tr>
<tr>
<td>Water Area (km²)</td>
<td>469,497</td>
<td>78,360</td>
<td>-83%</td>
</tr>
<tr>
<td>Cropland (km² )</td>
<td>1,790,000</td>
<td>679,993</td>
<td>-62%</td>
</tr>
<tr>
<td>Population (x1,000)</td>
<td>298,444</td>
<td>260,468</td>
<td>-13%</td>
</tr>
<tr>
<td>Population Density (people/ km²)</td>
<td>33</td>
<td>43</td>
<td>+23%</td>
</tr>
<tr>
<td>Ag Workforce (%)</td>
<td>0.6</td>
<td>74</td>
<td>+99%</td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>78</td>
<td>50</td>
<td>-36%</td>
</tr>
<tr>
<td>Literacy Rate</td>
<td>99</td>
<td>44</td>
<td>-55%</td>
</tr>
<tr>
<td>Carbon Emissions (x1,000 metric tons)</td>
<td>5,762,052</td>
<td>77,285</td>
<td>-99%</td>
</tr>
<tr>
<td>Oil Consumption (x1,000 barrels/day)</td>
<td>20,030</td>
<td>485</td>
<td>-98%</td>
</tr>
</tbody>
</table>
The Climate of West Africa

HOT AND DRY

HOT AND NOT-SO-DRY

HOT AND WINDY

HOT AND WET
# The Evolution of West African Agriculture

<table>
<thead>
<tr>
<th>Stage</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| 1. Collecting, Hunting, and Fishing        | - No permanent settlements  
                                              - No cultivation or rearing of stock                                          |
| 2. Shifting Cultivation                    | - Homesteads moved as fields shifted                                          |
                                              | - Cultivation practiced                                                      |
                                              | - Hunting and fishing still substantial                                      |
| 3. Recurrent Cultivation, Bush/Fallow Rotation | - Homesteads permanent  
                                              - Fields shift or rotate                                                      |
                                              | - Home garden present with some livestock and cultivated trees and shrubs     |
4. Permanent Cultivation

| A. Lowlands | ✓ Widespread permanent farming system  
|             | ✓ Arable crops, spices, and tree crops with livestock present  
|             | ✓ Dominant in areas of high population  

| B. Highlands | ✓ Terrace and mixed farming in defensive locations  

5. Specialized Cash Cropping | ✓ Cash crops grown in almost pure culture and in rotation with other crops  

6. Non-agricultural Work | ✓ Some people move to other professions and some farmers engage in multiple occupations  

Traditional Farming Systems of the Humid Tropics of West Africa
Historic Food Crops of West Africa

- Crop/Livestock Combination
- Mixed Grain
- Mixed Grain and Roots
- Rice
- Bananas and Roots
- Roots
The concepts of incorporating trees in agriculture have shifted over time. Tree loss has occurred as a result of increased permanent cultivation and cash-cropping, human population growth, and desertification. Recent reforestation efforts have largely been reactive, using a wide variety of fast-growing, non-native tree species. Agroforestry efforts have focused on local farmers.
# Elements of Tropical Agroforestry

## Trees with Crops

<table>
<thead>
<tr>
<th>Rotated in Time</th>
<th>Spatially Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>(sequential)</td>
<td>(simultaneous practices)</td>
</tr>
<tr>
<td>Shifting Cultivation</td>
<td>Multiple uses of trees on cropped land</td>
</tr>
<tr>
<td>Tree Fallow</td>
<td>Mixed multi-story tree and crop arrangements (i.e. home gardens)</td>
</tr>
<tr>
<td>Taungya (Tree plantations/Intercropping)</td>
<td></td>
</tr>
</tbody>
</table>

## Spatially Zoned

(simultaneous practices)

- Intercropping, Boundary Planting, Strip Cropping, Windbreaks, Windstrips, Shelterbelts, Wildlife Habitat Planting, and Riparian Forest Buffers
Elements of Tropical Agroforestry

Trees with Grass and Animals

<table>
<thead>
<tr>
<th>Spatially Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>(simultaneous practices)</td>
</tr>
<tr>
<td>Silvopasture</td>
</tr>
<tr>
<td>Fodder Banks</td>
</tr>
<tr>
<td>Fuelwood Lots</td>
</tr>
<tr>
<td>Mixed Orchards</td>
</tr>
</tbody>
</table>
Soils of West Africa

- Utilized the NRCS Soil Classification System.
- Soil Orders included Aridisols, Alfisols, Entisols, Inceptisols, Oxisols, and Ultisols.
- Briefly described the specific characteristics of each Soil Order.
Crops of West Africa

Sub-headings of Crop Section

Description
- Type
- Habit
- Height
- Pollination
- Stems
- Flowers
- Fruit
- Seeds

Environment
- Rainfall
- Temperature
- Soils
- Tolerance

Cultural
- Planting
- Thinning
- Weeding
- Nutrients
- Harvesting
- Storage

Damaging Agents
- A brief description of the insects and diseases that may impact the species.

Uses
- A brief description of the various uses for the different parts of the plants.

Nutrition
- A brief description of what the plants may offer in the form of human nutrition.
Cover Crops of West Africa

- Northern Gamba Grass
- Giant Star Grass
- Blanket Grass
- Broadleaf Setaria
- Molasses Grass
- Elephant Grass
- Bermuda Grass
- Weeping Love Grass
- Guinea Grass
- Rhodes Grass
- Buffel Grass
- Kikuyu Grass
- Broadleaf Setaria
- Molasses Grass
<table>
<thead>
<tr>
<th>Sub-headings of Cover Crop Section</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>A brief narrative to assist in the field identification of species.</td>
</tr>
</tbody>
</table>
Sub-headings of Tree Section

- **Description**
  - Height
  - Form
  - Bark
  - Thorns
  - Leaves
  - Flowers
  - Fruit

- **Environment**
  - Site
  - Climatic Zone
  - Soil
  - Drainage
  - Biophysical limits

- **Nursery Specifics**
  - Seed collection
  - Seed storage
  - Seed Treatment
  - Germination
  - Beds
  - Pots

- **Management**
  - Establishment
  - Spacing/
  - Rotation
  - Coppice/
  - Pollard
  - Resistance

- **Uses/Benefits**
  - Provides a brief description of the various ways that the trees and their products may be used.

- **Conservation**
  - Soil
  - Agro-
  - Forestry
Elements of the Site Assessment

- Site Assessment
  - Crop Production
  - Inputs
  - Tree Management
  - Livestock
  - Cultural, Social, and Economic
    - Water Management
    - Soil Management
    - Pest and Disease Management
How many months of rain in a typical growing season?

How much rain typically falls during this time?

Are the rain events consistent?

Are any of the crops irrigated?

If so, which crops and how often is irrigation necessary?

What is the source of water used for irrigation by the local people?

Can this source be relied upon on a consistent basis?

Does the water for irrigation come from the same source as the water used by local households?
Soil Management

Are any efforts made to enhance the soil where crops are grown?

Are soil additives natural or synthetic?

Does the farmer incorporate conservation practices?

How are crop residues utilized?

Are the fields burned over after harvesting is complete?
Are there any major pests or diseases that effect yields?

Are these present every year?

What techniques are used to reduce the damage they cause?

What symptoms are related to these and at what stage of growth do they appear?

Does the farmer rotate crops?
What was the major cause of seedling mortality?

Common tree species found in the local area?

Are the trees managed individually or in reserves?

Are any of the trees of religious significance?

Has the farmer planted trees in the recent past?

If so, list the year, type, and number of trees planted.

What was the survival rate of the seedlings planted?

What was the major cause of seedling mortality?

Were any efforts made to protect the seedlings from browse damage? If so, what?

Were any efforts made to water the seedlings? If so, what?

How is the ownership of trees determined?

Does the farmer incorporate any agroforestry practices?
Type, number, current value, and local uses of livestock in possession. ~ Do any of the animals have religious significance? ~ Who cares for the livestock? ~ What are the local customs related to the care of the various livestock (free-range, tethered, etc.)? ~ Do these methods vary by season? ~ Type of feed? ~ Do the types of feed vary by season? ~ Are any crops or grasses harvested and stored specifically for feeding livestock? ~ If so, what and how much is reserved? ~ Is any of the livestock manure used for soil enrichment? ~ Does the farmer practice composting? ~ What are the major illnesses or parasites that affect the local livestock? ~ How are these treated?
Describe the land tenure system in the local area. How many people make up the farmer’s “household”? Do all of these people rely on the crops, trees, and livestock associated with this assessment? Do any members of the “household” contribute income from outside sources? If so, where else do they work? Where is the nearest market to the “household”? Is this the market that is most often used to buy and sell goods? What crops are used to produce the main food(s) of the local area? Is it possible for a family to grow enough food in a typical year to feed themselves for the year? Has the farmer attempted any new farming practices recently? Level of activity in local farming groups or co-operatives (past or present)? Proximity to the nearest agricultural station or school? Availability of improved seed/seedling varieties? What is the main source for the fuel that is needed for cooking? How far must the collectors go for firewood? Is charcoal available locally? What is the dominant local language? What is the dominant social group (tribe)? Are the surrounding tribes known for any varying agricultural practices or production? What role do women and children have in production?
**Resources**

**Presentation Maps:**


**Evolution of West African Agriculture and Traditional Farming Systems:**


**U.S. / West Africa Comparison Values:**

http://www.nationmaster.com/index.php

**African Soil Map:**

http://soils.usda.gov/use/worldsoils/mapindex/metadata/maps/afroder.gif

**Soil Organic Carbon of West Africa Map:**

http://soils.usda.gov/use/worldsoils/mapindex/soc.html