Designing an agroforestry system

Productivity: Managing Interactions

Positive **interactions**

- Shelter
- Microclimate
- Soil OM
- Nutrients
- N fixation
- Pest & disease control
- Pollination

PRODUCTIVITY

Negative **interactions**

Competition for:

- Light
- Water
- Nutrients
- Space
- Labour

Varies spatially & temporally (season/yr/rotation)

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Design Considerations: drivers

What are the key drivers?

- Food/fuel/fibre security?
- Increased productivity?
- Environmental protection?
- Cultural resource?

Are there any conflicts between the key drivers?

e.g. Productivity vs. env protection

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Design Considerations: constraints

What are the key constraints?

- Land resources
- Financial resources
- Afforestation legislation (or felling restrictions)
- Management skills and time
- Site characteristics and location

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Site characteristics

- Soil characteristics (water availability and nutrient supply)
- Topography (mechanical access, effect on water supply and nutrients)
- Exposure and aspect
- Climate (precipitation, temperature, humidity)
- Site size
- Location – access, distances for processing and end use (optimal logistic chain)

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Species selection: products

Food

Fuel

Fodder and forage

Timber

Fibre

Gums and resins

Thatching and hedging

Gardening materials

Medicinal products

Craft products

Recreation

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Species selection: characteristics

Trees

- Deciduous/evergreen
- Native/exotic
- Canopy structure
- Canopy density & timing
- Root structure
- Growth periods
- Harvest timings
- N fixation
- Allelopathic

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Species selection: characteristics

Crops

- Shade tolerance: C3 vs C4 plants
- Growth periods
- Harvesting timings
- Susceptibility to allelopathic chemicals

Livestock

- Breed suitability for agroforestry – ranging behaviour
- Browsing/foraging impact
- Utilisation of woody browse

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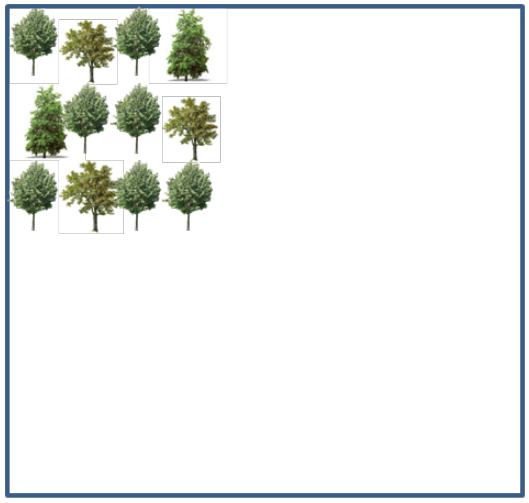
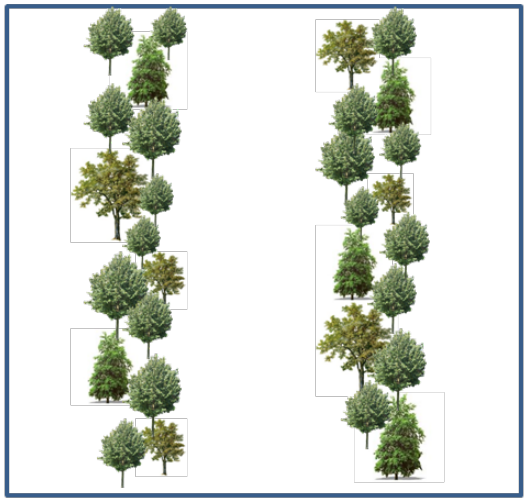
Spatial arrangement



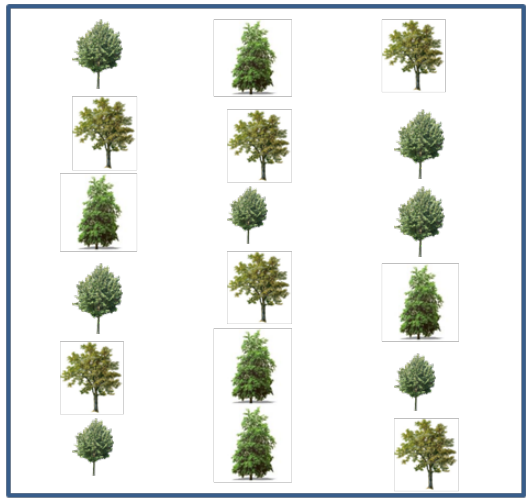
Farm woodland

Clumps



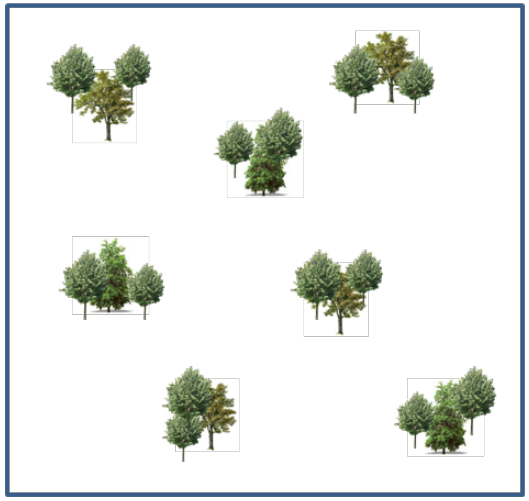
Shelterbelts

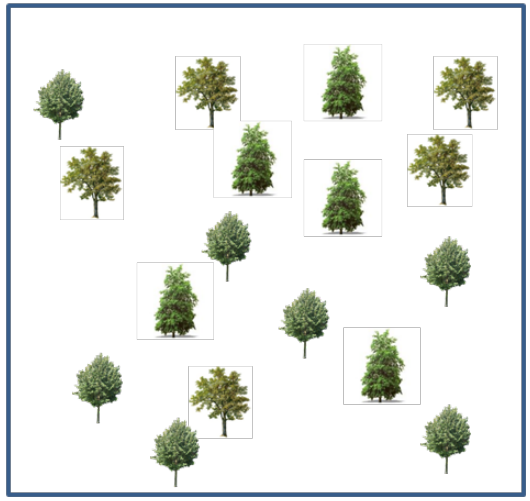
Single trees (regular)



Tree rows

Single trees (irregular)





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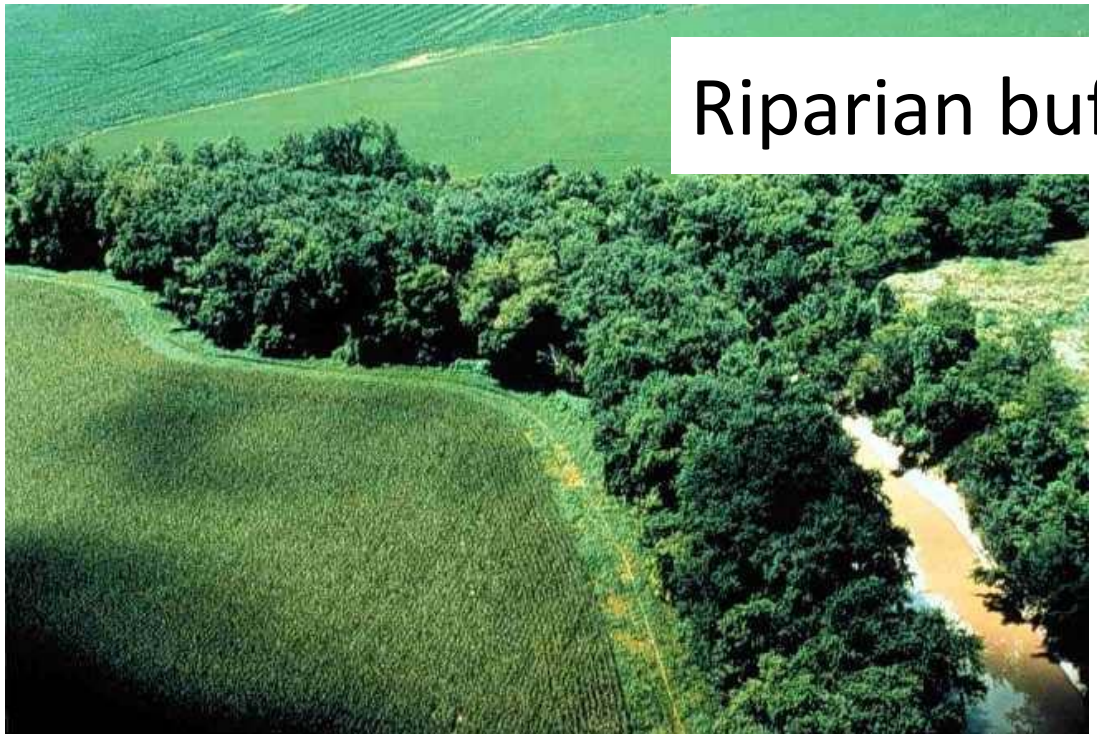
Riparian buffers



Contour planting

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Spatial arrangement

Tree Orientation

- Rows north/south to reduce shading on crops
- Shelterbelts orientated against prevailing winds
- Contour planting to reduce soil erosion
- Riparian buffers
- Odour or GHG buffers surrounding livestock housing

Tree density

- Trade-off between high volume wood production and greater competition with neighbouring crops at high densities
- Management of widely-spaced trees.
- Alley width determined by machinery size

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Temporal arrangement

ROTATIONAL VS PERMANENT AGROFORESTRY

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Establishment and Management

- Thinning and pruning – above and below ground
- Weed control in early years
- Pest control
- Protection from animals in early years and during regeneration
- Harvesting – trees and crops
- Tree stump and root removal after harvest

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