Analog Forestry - A Promising Strategy for More Sustainable Agriculture in Tropical Regions

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What is Analog Forestry?

- **Mimics natural forest** structure and produces marketable products.

- Fills all the ecological niches with **productive species**

- Uses **native and exotic** plants

- provides the same **ecosystems services** like natural forests

Advantages

- Uses many plant species, leading to very **high biodiversity** (Fig. 1)

- Increases soil organic carbon content and **improves soil fertility** [1, 2]

Fig. 1 Different land-use systems in the same region. Cattle pasture (1a) and Analog Forestry (1b). Photos: T Selecky and SD Bellingrath-Kimura

- Perennial character makes tillage unnecessary and **prevents soil erosion**

- Effective in **carbon sequestration** [3]

- Combines numerous crops and therefore leads to **diversified production**

- Source of ample **rural employment** opportunities [4]

- important role in **subsistence** for local communities [4]

- Combines agriculture with **forest restoration** [5]

- High structural diversity allows **maximal use of resources** (Fig. 2)
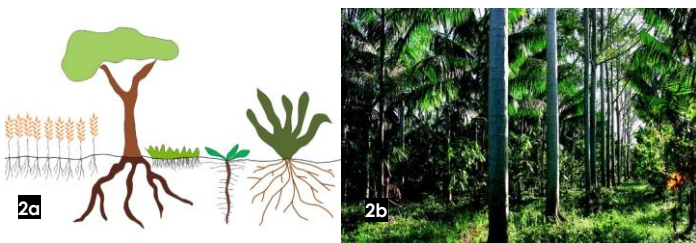

Fig. 2 Different plants occupy different soil horizons (2a) and canopy layers (2b). This way, productive potential of every place can be maximized. Picture: T Selecky, Photo: R Porro

Drawbacks

- **Lack of markets** for tree specialty products and uncommon fruits [6] (Fig. 3)

- Difficult use of machinery inside Analog Forests leads to **high labor costs** [4]

- **Demands knowledge** about native and analog plants [6]

- Needs **start-up capital** [6]

- **Few exemplary sites**

Fig. 3 Forest Garden Products (FGP) Certification helps to sell Analog Forestry products worldwide

Design process

- Established by **ecological succession**: Pioneer species → secondary species → climax species [7]

With time, **complexity increases** (Fig. 3)

1st step: planting medium-cycle crops (papaya, banana, passion-fruit, black pepper) with annuals (cowpea, rice, watermelon, pumpkin) [8]

2nd step: introduction of long-cycle crops (cocoa, coffee, guarana, rubber-tree and many other forestry or fruit species) [8]
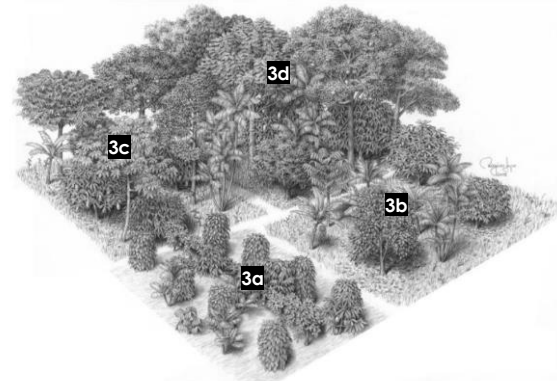

Fig. 3 Growth of Analog Forest in Tome Acu with increasing height and structural complexity. Age progression: 3a → 3b → 3c → 3d. Source: [9]

Nutrient cycling

- As Analog Forests mature, their **ability to sequester, accumulate and recycle nutrients** increases [1]

- Soils in Analog Forests had **high organic carbon content** (Fig. 4a)

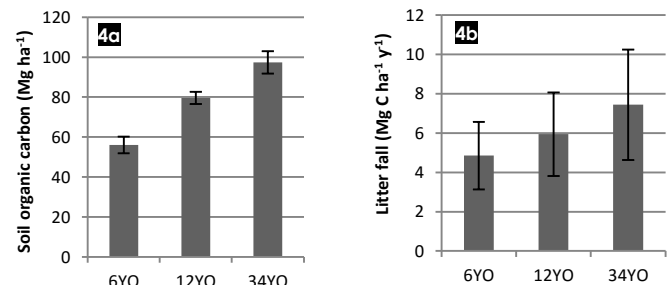- **Litter fall increases** with age of Analog Forests (Fig. 4b)

Fig. 4 Soil organic carbon (4a) and litter fall (4b) increase with age of Analog Forestry. *YO* years old. Source: [1]

Conclusion

- Analog Forestry **improves fertility of tropical soils** [2]

- It is a **sustainable land-use system,** preserving natural resources [1]

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