Assessment of C- stock and earthworm population for a forest-to-coffee conversion in Sumberjaya, West Lampung

World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES
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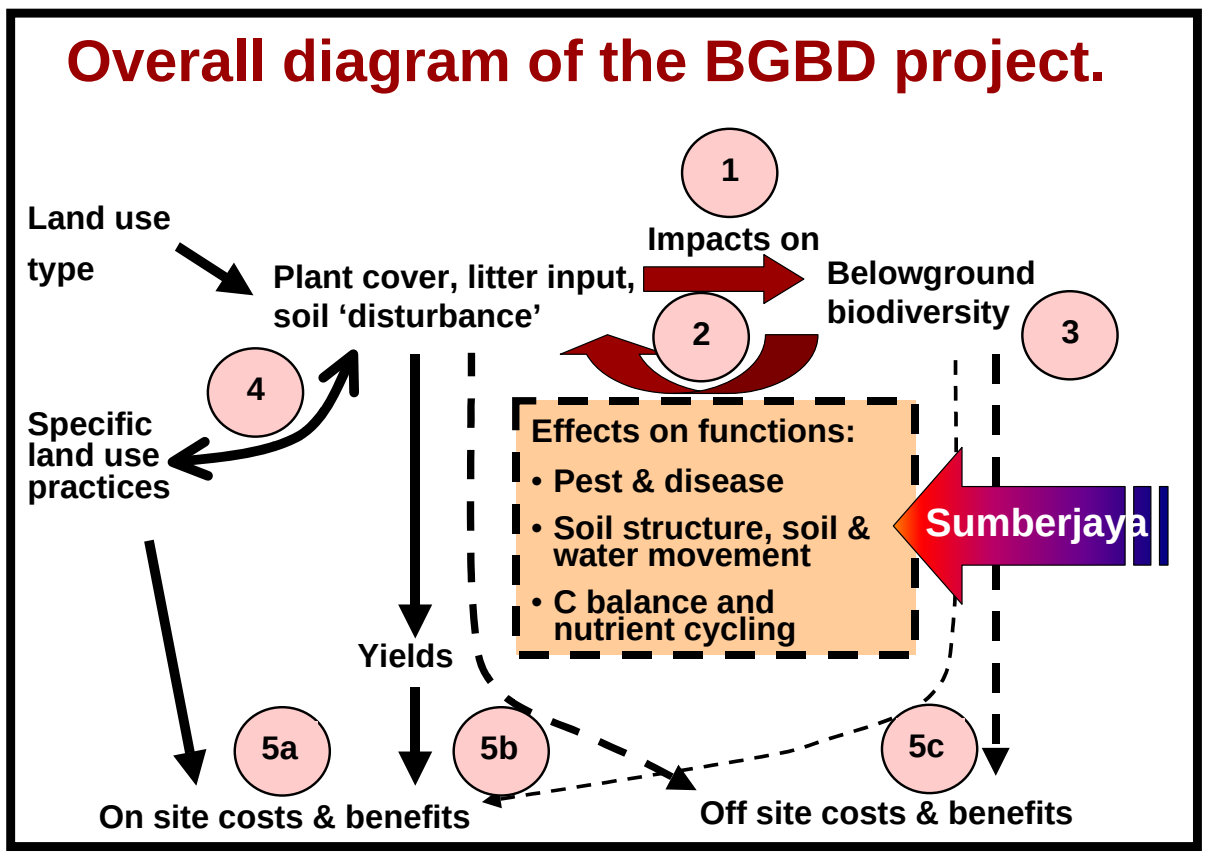
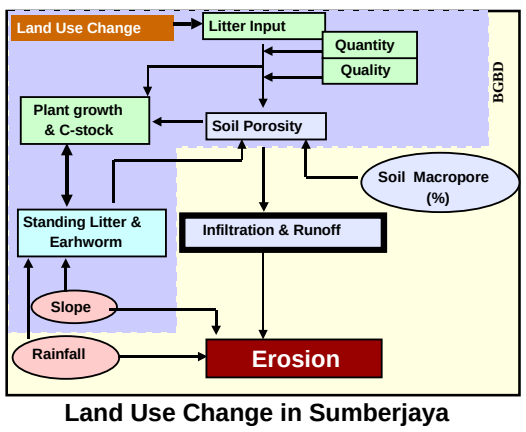
Objective

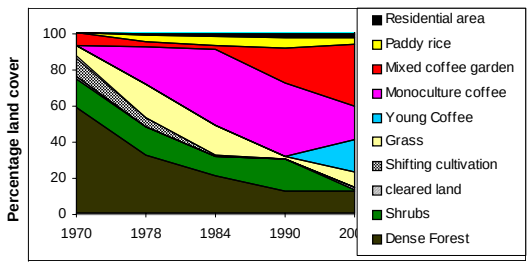
To asses above-ground C-stock and Earthworm pupulation density of Monocultural and multistrata coffee based system

Overall diagram of the BGBD project.

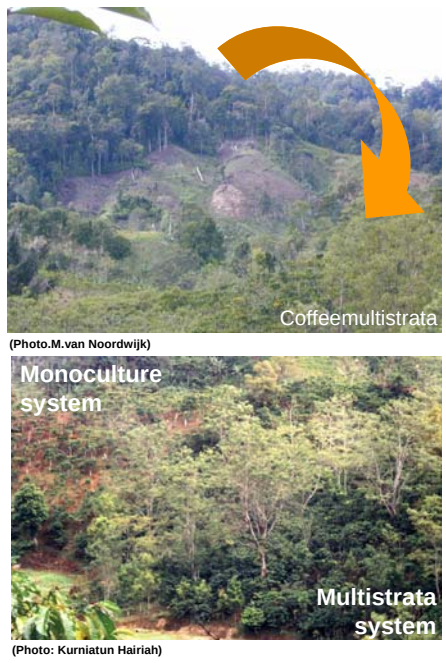




Land Use Change in Sumberjaya



(Van Noordwijk et al., 2002)

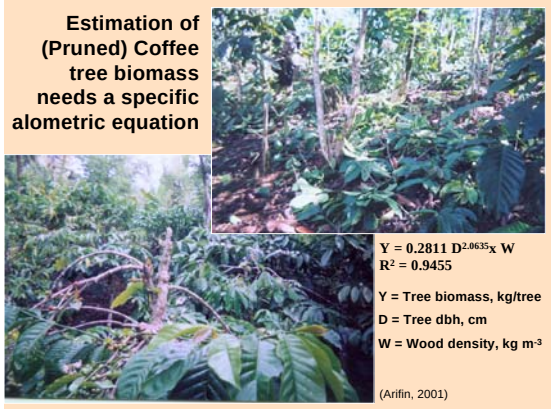


(Photo.M.van Noordwijk)

(Photo: Kurniatun Hairiah)

Carbon Stock at Plot and Landscape Level

Estimation of (Pruned) Coffee tree biomass needs a specific alometric equation

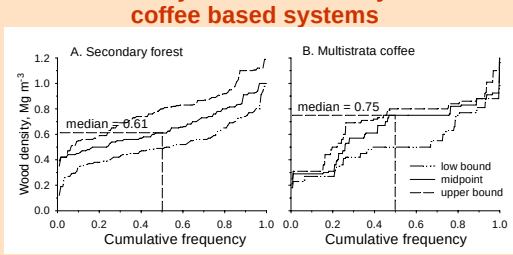


$Y = 0.2811\ D^{2.0635} x\ W$
$R^2 = 0.9455$

Y = Tree biomass, kg/tree
D = Tree dbh, cm
W = Wood density, kg m^{-3}

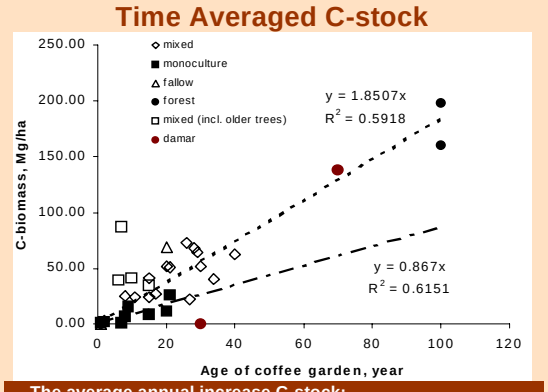
(Arifin, 2001)

Wood density under secondary forest & coffee based systems



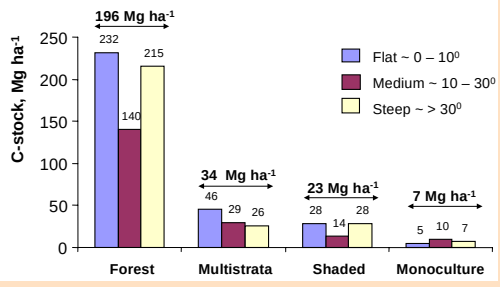
http:// wwwworldagroforestrycentre.org/sea

Time Averaged C-stock

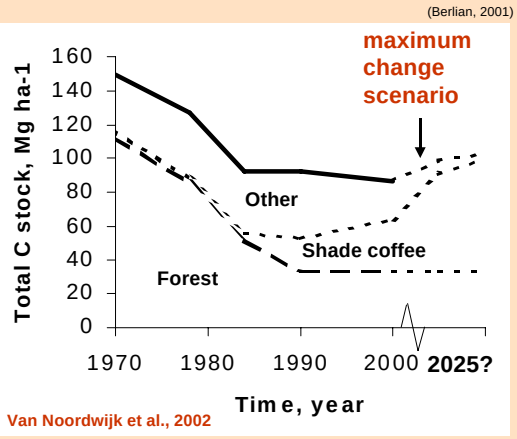


The average annual increase C-stock:
- **Multistrata ~ 1.9 Mg ha^{-1}**
- **Monoculture ~ 0.9 Mg ha^{-1}** *(Van Noordwijk et al, 2002)*

Total above-ground C-stock of coffee based system

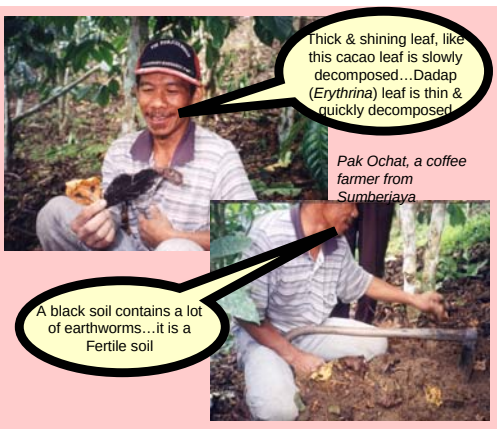


(Berlian, 2001)

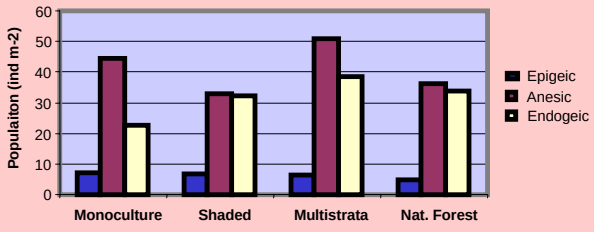


Van Noordwijk et al., 2002

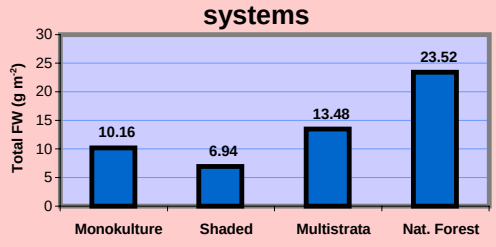
Earthworm and Soil Macropore



Population density of Earthworm on Agroforestry coffee based systems

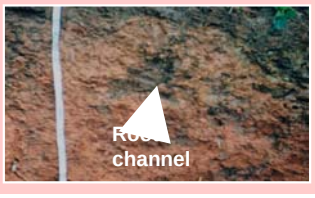


Total fresh weight of earthworm under Agroforestry coffee based systems



Ratio (anesic + endogeic)/total population = 0.94, 0.91, 0.92, 0.87, for natural forest , shaded coffee, multistrata coffee, and monocultural cofee system, respectively .

(Unibraw, November 2002)



CONCLUSIONS

☛ **Aboveground C -stock**
- For the remnant natural forest in Sumberjaya ~ 195 Mg ha^{-1}
- Monocultural coffee systems ~ 7 Mg ha^{-1}
- For simple shade coffee systems ~ 23 Mg ha^{-1}

☛ **The annual C accumulation rate**:
Coffee-based systems ~ 1 and 1.9 Mg C ha^{-1} yr^{-1} compare to 2.5 Mg C ha^{-1} yr^{-1} for jungle rubber agroforestry systems in Jambi (Tomich et al, 2000).

☛ Conversion of (remnant) forest to coffee based systems reduced the C_{org}/C_{ref} ratio from 0.8 to 0.5 ~ a loss of soil C of about 57 Mg C ha^{-1}.

☛ Ratio (anesic + endogeic)/total population = 0.94, 0.91, 0.92, 0.87, for natural forest, shaded coffee, multistrata coffee, and monoculture cofee , respectively