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Modules on Sustainable Agriculture MOSA

Agroforestry

This presentation was supported by
Patrick Worms, **World Agroforestry Centre (WAC)**

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TRANSFORMING LIVES AND LANDSCAPES

Learning objectives:

To define what is agroforestry

To enumerate some advantages of agroforestry

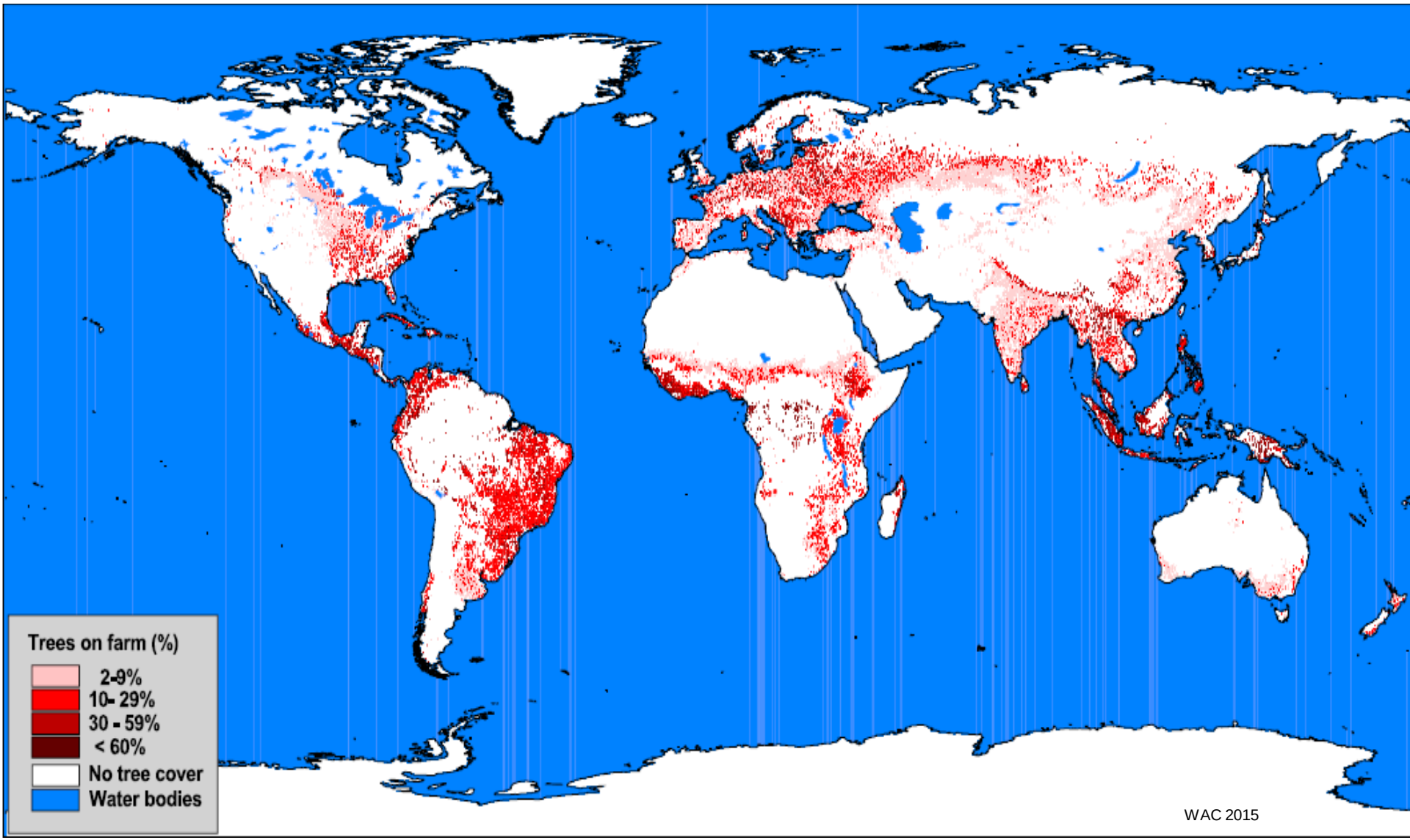
To differentiate the types of agroforestry

To enumerate ways in which trees build resilience

To enumerate some challenges in South East Asia

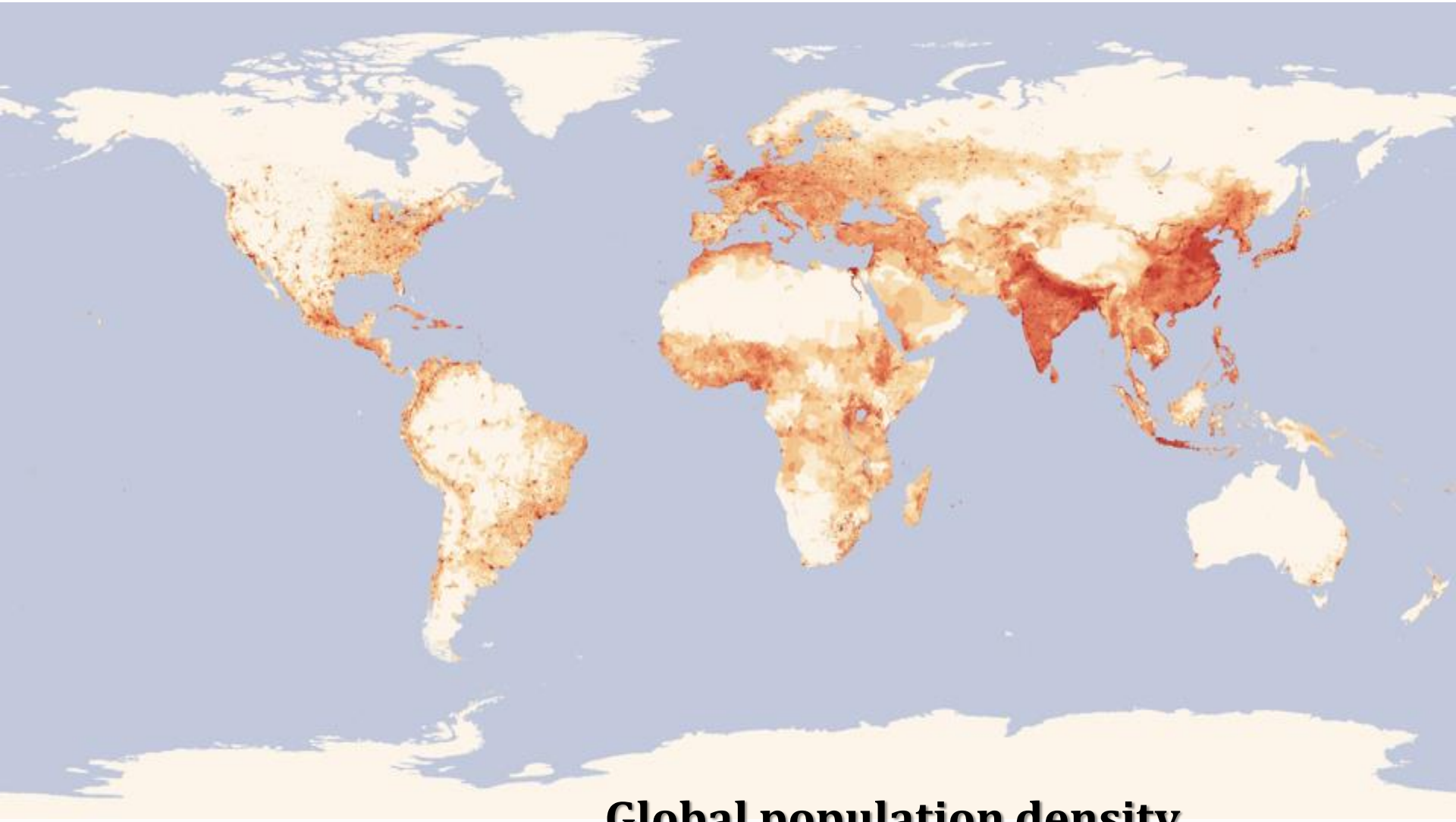
2

Prevalence Of Trees On Farms



WAC 2015

… and people cohabit everywhere.

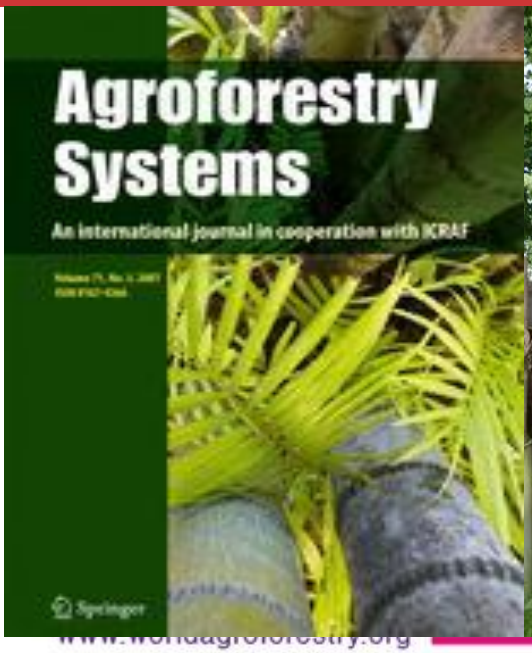


Global population density

© Patrick Worms, WAC



What is Agroforestry?

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"**Agroforestry** is a collective name for land-use systems and technologies where **woody perennials** (trees, shrubs, palms, bamboos, etc.) are deliberately used **on the same land-management units** as agricultural **crops and/or animals**, in some form of **spatial arrangement** or **temporal sequence.**

In agroforestry systems there are **ecological and economical interactions** between the different components (Lundgren and Raintree, 1982)."

http://www.google.com.ph/search?q=images+of+agro+forestry+in+the+philippines&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwjzh5eb38XPAhVIqJQKHRytBgUQ7AkINg&biw=1366&bih=667

Advantages of Agroforestry systems

1. It increases the fertility of soil and it helps in preventing soil erosion & nutrient loss.

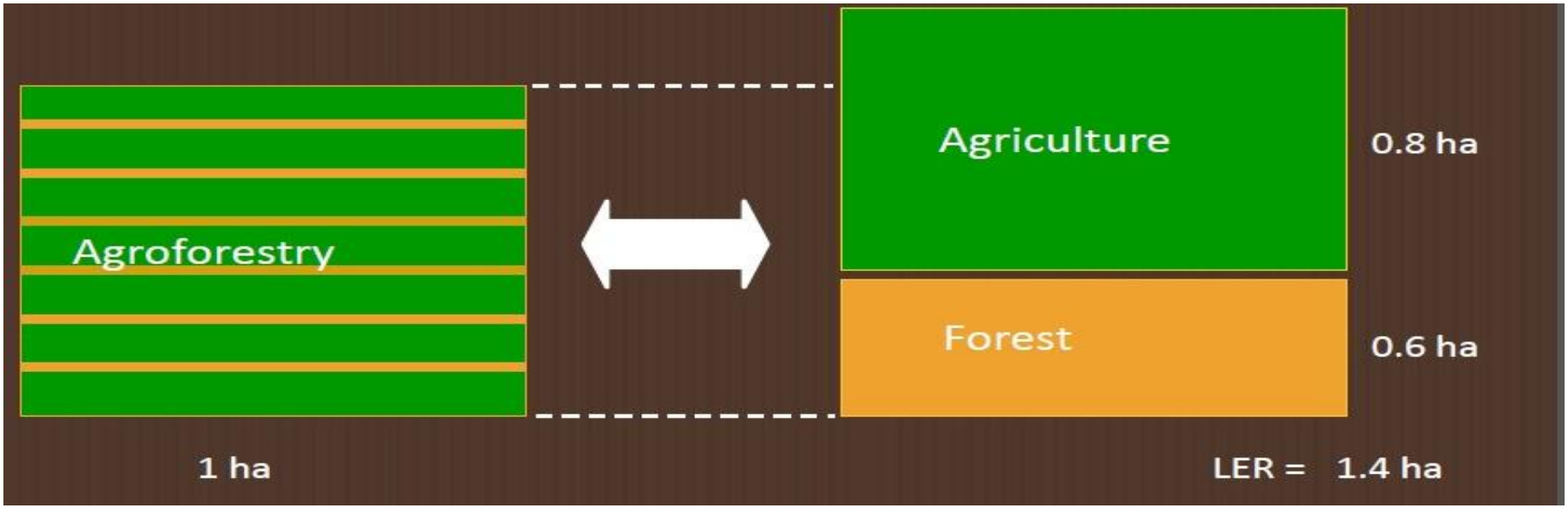
2. It increases the yield of crops.

3. It can increase the profit & productivity .

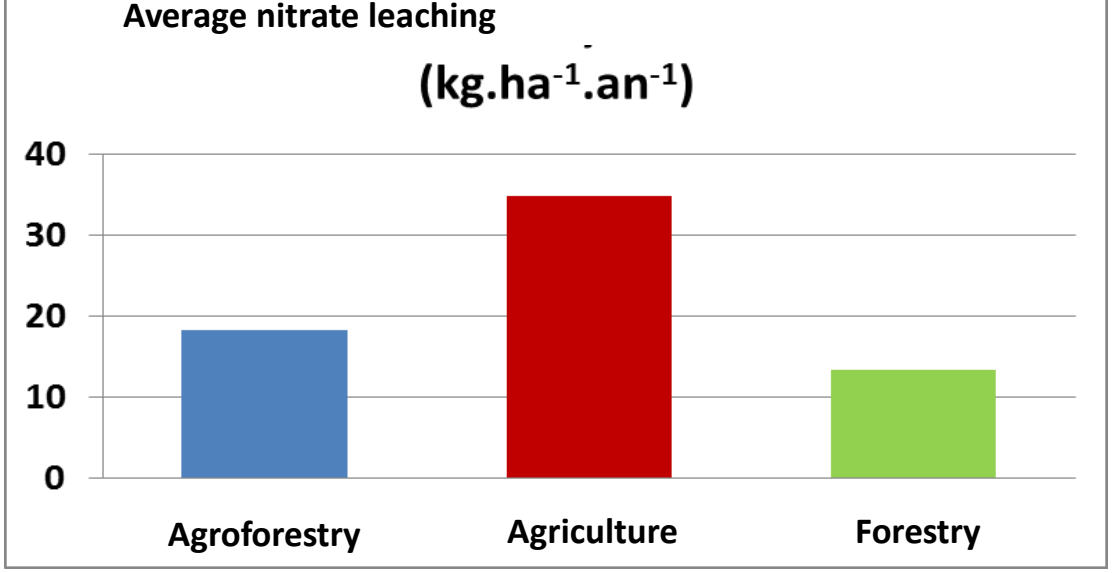
4. Source of protection for the animals and plants from different types of hazards.

5. It can reduce insect pest & diseases incidence.

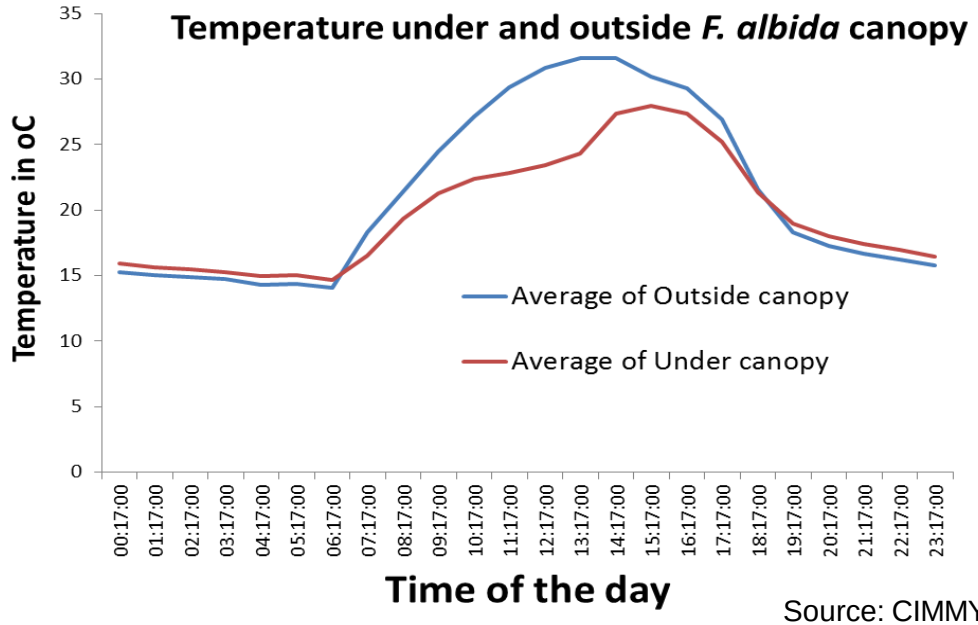
Land Equivalence Ratio (LER)



$$LER = \frac{Crop\ yield\ AF}{Crop\ yield\ monocrop} + \frac{Tree\ product\ yield\ AF}{Tree\ product\ yield\ forestry}$$



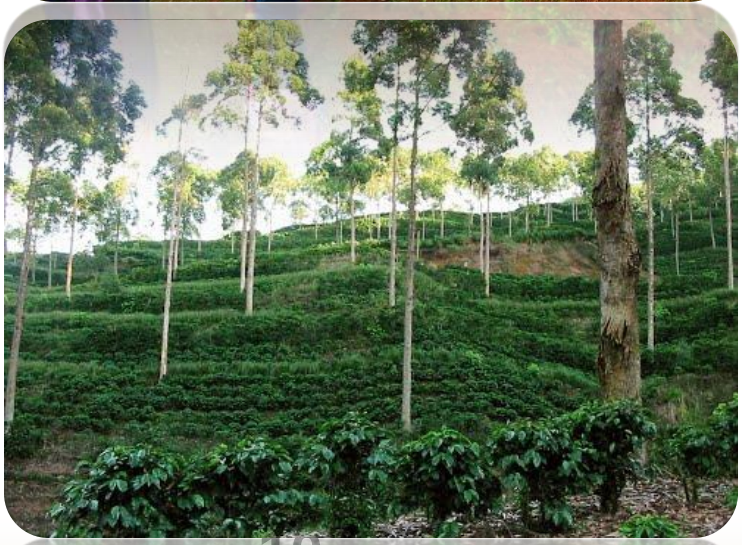
Source : INRA Restinclières, France



Source: CIMMYT

TYPES OF AGROFORESTRY SYSTEMS

I) AGROSILVICULTURAL SYSTEMS



Agricultural crops are intercropped with tree crops

http://www.google.com.ph/search?q=images+of+t+of+arabica+coffee+planted+under+pine+trees+in+the+Benguet+philippines&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjasOT71MfPAhXCk5QKHfh9BDIQ_AUICCgB&biw=1366&bih=667#tbm=isch&q=images+of+t+of+arabica+coffee+planted+under+pine+trees+in+Benguet+philippines&imgrc=e30MSDV310aUBM%3A

http://www.google.com.ph/search?q=images+of+agro+forestry+in+the+philippines&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwjzh5eb38XPAhVIqJQKHRytBgUQ7AkINg&biw=1366&bih=667#imgrc=pNI1LQUkCd-cBM%3A

TYPES OF AGROFORESTRY SYSTEMS

II) SILVOPASTORAL SYSTEMS

The production of woody plants combined with pasture is referred to *Silvipasture system.* The trees and shrubs may be used primarily to produce fodder for livestock or they may be grown for timber, fuelwood, fruit or to improve the soil.

This system is classified in to three categories

a) Protein bank
b) Live fence of fodder trees and hedges
c) Trees and shrubs on pasture

http://agritech.tnau.ac.in/forestry/agroforestry_index.html#types

Source: Picture from Department of Veterinary Services Malaysia

http://www.google.com.ph/search?q=goats+raised+under+trees+in+the+philippines&biw=1366&bih=667&tbm=isch&tbo=u&source=univ&sa=X&ved=0ahUKEwik3qeHjMbPAhXLpI8KHfv8BolQ7AkINQ#imgrc=H7_96EFXIX-DfM%3A

TYPES OF AGROFORESTRY SYSTEMS

III) AGROSILVOPASTORAL SYSTEMS

The production of woody perennials combined with annuals and pastures

This system is grouped into two categories.

a)Home gardens
b) Woody hedgerows for browse, mulch, green manure and soil conservation

http://agritech.tnau.ac.in/forestry/agroforestry_index.html#types

Question to the participants:

- From the different types of Agroforestry systems mentioned which is common in your country? Is it *Silvicultura*l, *Silvopastoral*, *Agrosilvopastoral* or *Others*?

Ways in which trees build resilience

- **Soil restoration:**
  - more SOC, richer soil microbiology, enhanced percolation, less erosion, less degradation
- **Soil fertility:**
  - more SOC, more N if legumes, nutrient pump
- **Increased carbon accumulation**
  - 2-10 tons of $CO_{2\text{-eq.}}$ per hectare per year are common
- **Higher biodiversity:**
  - More niches for pest predators
- **Lower input requirements:**
  - fewer pesticides, fewer fertilisers
- **Better, crop yields**:
  - more soil organic matter, better plant nutrient availability, protective microclimate

Higher productivity:

- better use of water, nutrients, light

- **Better nutrition:**
  - fruits, fodder, multi-crop system support
- **Livestock farming:**
  - fodder, shelter
- **Weather resilience:**
  - roots pump water, trees offer shade and windbreaks
- **Insurance & savings:**
  - One off timber sales
- **Income diversification:**
  - crops, fuel, fodder, timber, fruits
- **Reduced deforestation:**
  - more tree products sourced off-forest
- **Flood control & water recharge:**
  - Marketable environmental service

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… then why this?

5 major challenges hindering agroforestry in South-East Asia

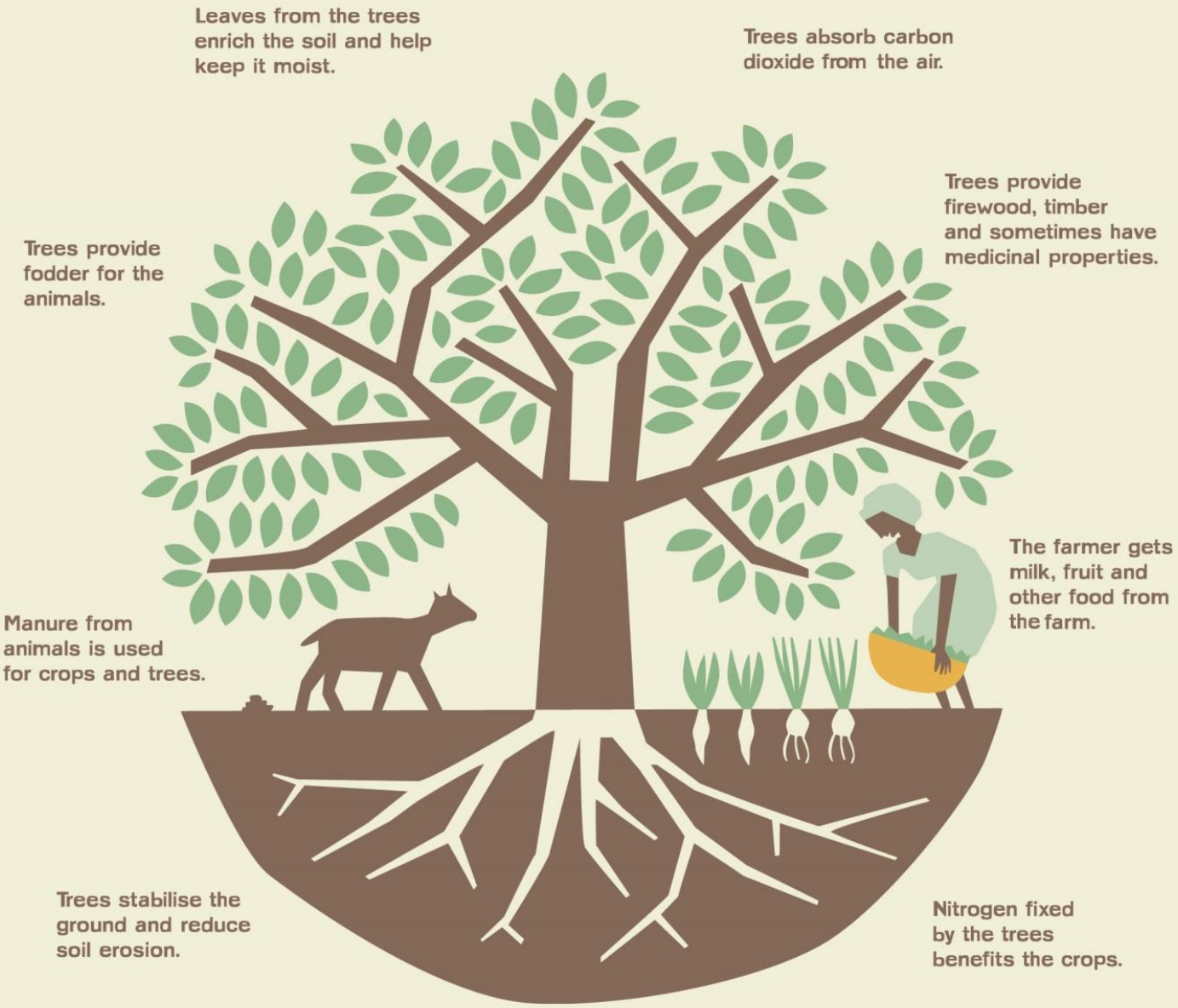
- Govts. Partial approach to research which translates into law adoption of research recommendation
- Land Tenure Insecurity
- Trade off between conservation & devt. Activities lead to difficulty in deciding forest mgt.
- Slow progress of community based forestry mgt. schemes introduced by the ministry of forestry hampered agroforestry devt.
- Emerging issues related to climate change & affected forestry & land mgt.

Opportunities

- Huge pool of knowledge worldwide
- Increasing support for agro-forestry related policies
- Availability of potential partners in R & D

thtp://www.terradaily.com/reports/Challenges_hinder_agroforestry_research_policy_formulation_and_adoption_in_Indonesia_999.html

In Summary....



© http://www.viagroforestry.org/files/ 2014/05/Tree-Illustration_PLAIN-01.jpg

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Thank you!

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