

Technical Bulletin #95:

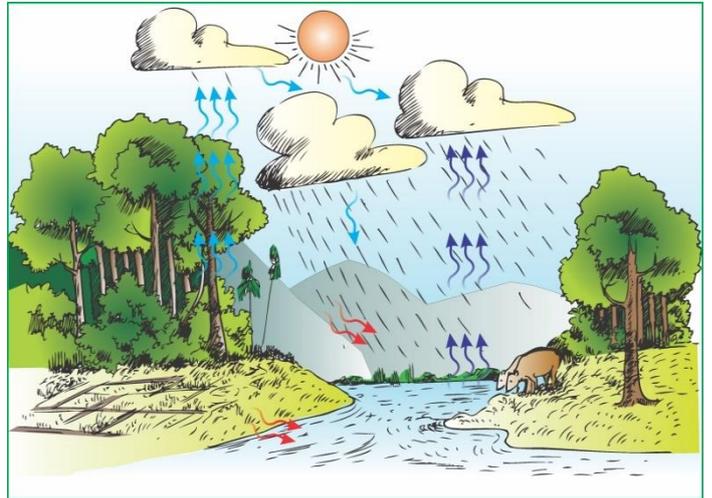
## Agro-Ecology: Basis of Agro-Forestry and Wood-Lots

The demonstration sites for Cambodia HARVEST wood-lots and agro-forestry sites **use agro-ecology as the basis for design and implementation.**

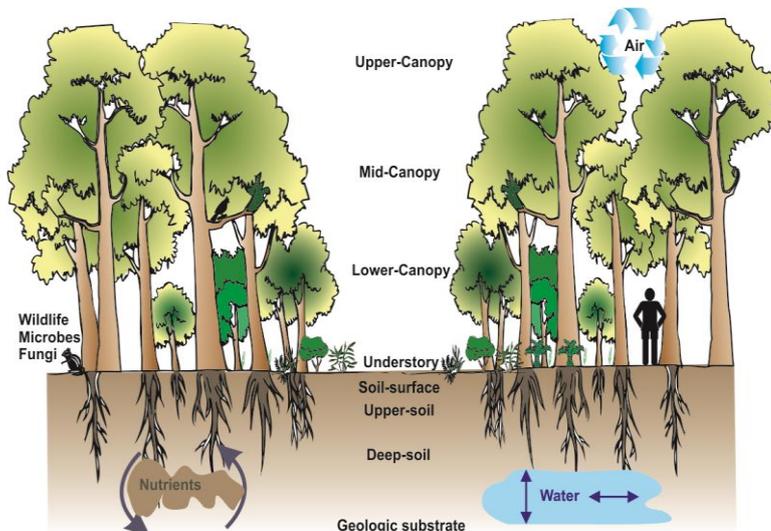
*Agro-ecology combines **perennial, multipurpose** crops (crops that are planted once but continue to produce yields for many years such as trees, lemongrass, and peppers) with **annual, agricultural** cash crops.*

### What is Ecology?

- The relationship between living organisms and the natural environment.



Agro-ecology *enhances* agricultural systems by **mimicking** these natural processes:



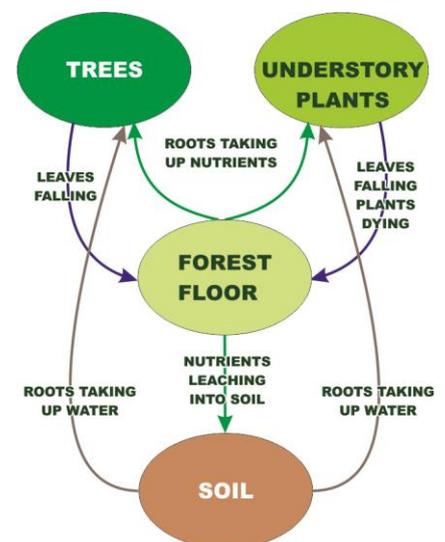
**Agro-ecology can be thought of much like the natural forest, where fertilizer and pesticides are not added. Rather, the forest ecosystem takes care of itself, creating an efficient, productive balance between all species present.**

*All growing space is used. Crops fit together.*

- **Vertically** - tall, medium, and short plants are used
- **Horizontally** - all planting spots are occupied
- **Underground** - deep-rooted and shallow-rooted plants

Elements in the Design and Implementation of Agro-ecosystems:

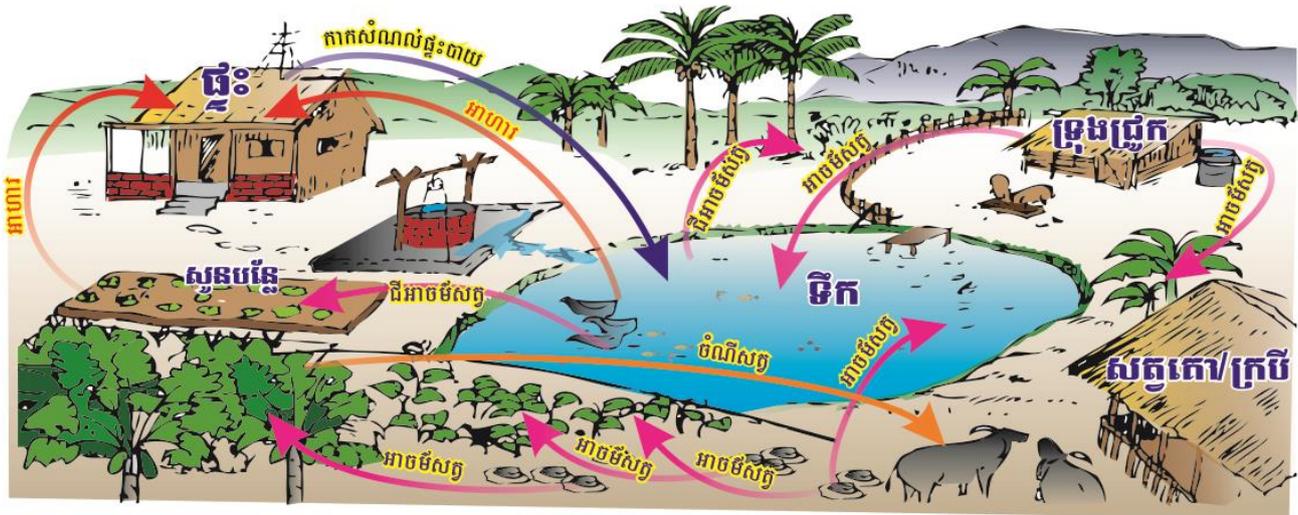
- Layers of a forest-ecosystem: canopy, shrub/understory, groundcover, nitrogen-fixing trees
- Fertility in a forest: Nitrogen-fixing trees, mulch, leaf litter, decomposition
- Pest-control: natural insecticides, beneficial insects, ecological balance
- Reproduction of agro-ecology systems through careful design that incorporates the main species for the project with second tier beneficial species



- Use of living fences, fodder banks, contour planting

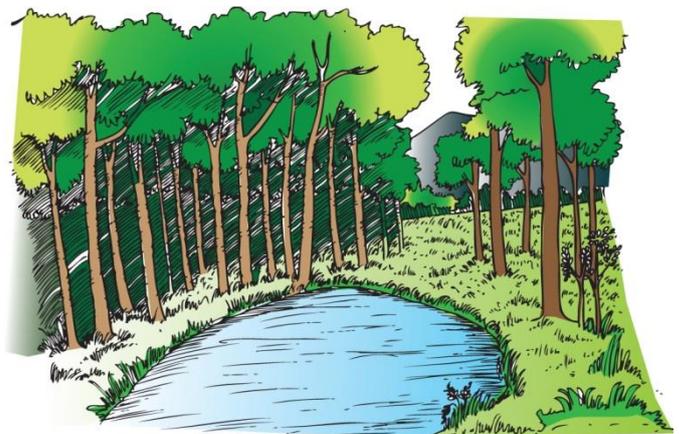
Plants, people and animal in an agro-ecosystem work together to create a stronger system by:

- **Recycling** nutrients and energy, reducing outside inputs;
- **Integrating** crops and livestock;
- **Diversifying** crops, using more than one species; and
- Creating beneficial **interactions** between all species, animals and human uses.



Careful consideration is given to time in particular when crops and trees are planted.

- The first plants established are adapted to full sunlight.
- Plants that can give shade are planted before plants that can tolerate or require shade.
- Plants that enrich the soil are planted before plants that require lots of nutrients.
- Plants that require sun are not planted where other plants will shade them before they mature.
- Medium-sized and large trees are planted so they have room to grow.



It has been found that **productivity increased an average of 79% using a agro-ecology system.**

**Summary of Benefits for Agro-Ecology:**

- Improved year-round production of food and useful products
- Reduced labour and expensive inputs
- Protection and improvement of soil and of water sources
- Increased production
- Increased adaptability to change in weather patterns
- Shade for vegetables and other crops that require or tolerate shade

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