" Responding to an Understanding of Forest : Analog Forestry"

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What is a forest ?

Forests are tree dominated ecosystems displaying the seral dynamics of ecosystem maturity and possesses tree crown cover (stand density) of more than 20% of the area*.

The tree species of a forest account for less than 01 % of the biodiversity of such formations and help in maintaining total biodiversity.

The tree species of a forest account for over 80 % of the biomass of such formations and help in maintaining the ecosystem space.

** The figure of 20% tree crown cover (stand density) as defining a forest comes from the FAO 1990 Forest Resources assessment, FAO Rome. This is a very minimal figure. In Tropical the document requires a 10% crown cover. There must be an immediate review of the figure and make it context specific.*

If this figure of stand density is accepted for a forest that had 80% canopy cover , reducing it to 20% will still sustain a forest. The allowable loss of forest crown to retain the definition of a forest should be a maximum of 40% .

Biodiversity

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Biodiversity is the myriad patterns manifest in the biomass created by the sun.

The Convention on Biological Diversity (CBD) defines biodiversity as:

"*the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems.*"

In other words the diversity of life at a genetic, species and ecosystem level

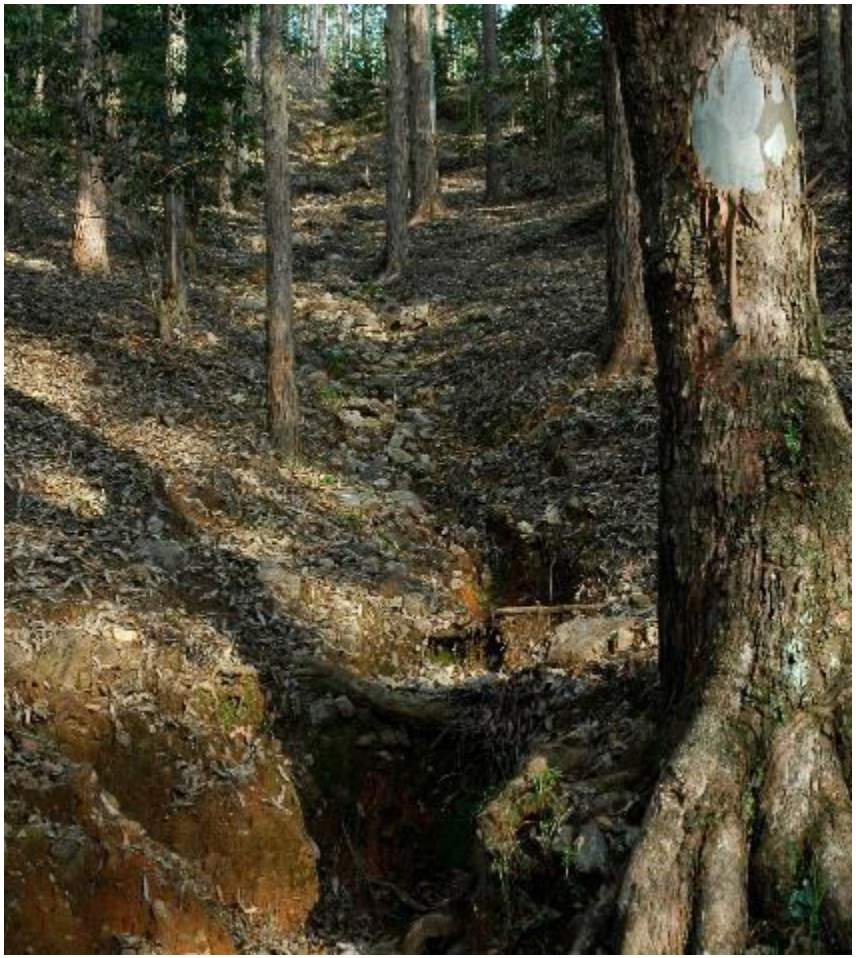
Learning to *see* a forest

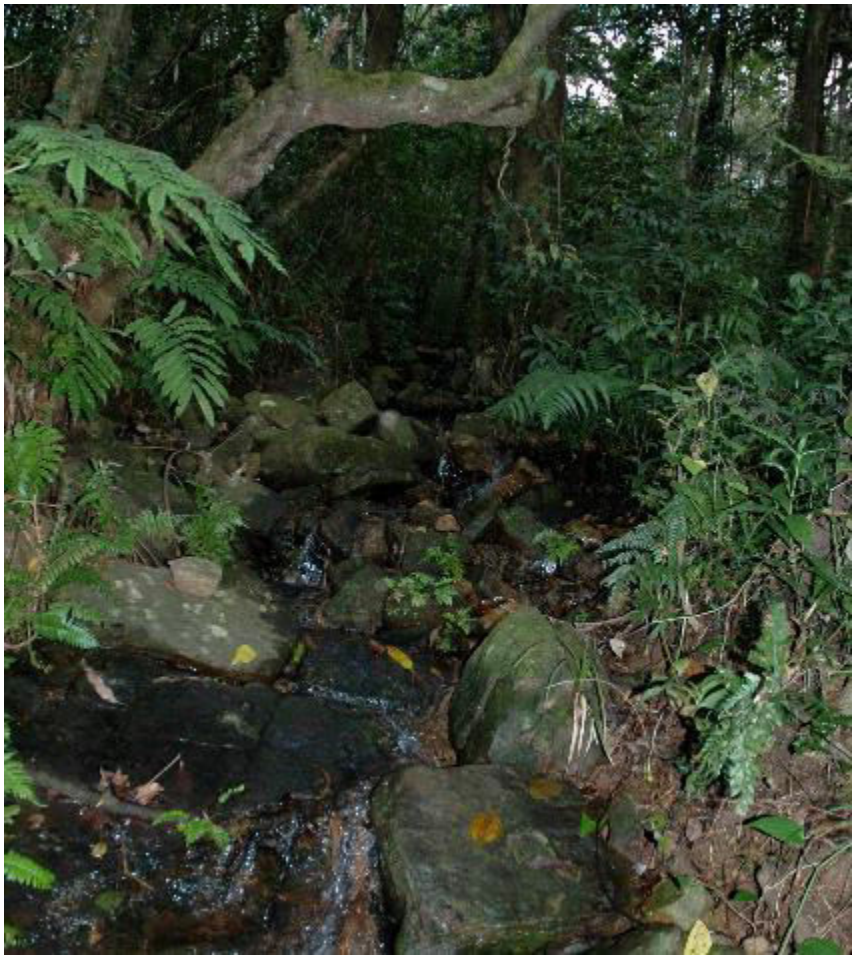
- **"The forest is a peculiar organism of unlimited kindness and benevolence that makes no demand for its sustenance and extends generously the products of its life activity; it affords protection to all beings, offering shade even to the axeman who would destroy it**" Gautama Buddha (460 BCE)
- *This is the first known reference of a forest as an ecosystem and tis production of ecosystem services*.

- **Trees do not, a forest make - Old European Adage**
- *Trees represent 1% or less of the biodiversity of any forest.*

- **The Current official view of foresters.**
- *'The first and foremost purpose of a forest growth is to supply us with wood material; it is the substance of the trees itself, not their fruit, their beauty, their shade, their shelter, that constitutes the primary object,' (*Fenrow the Head of US Forest Service 1920)

However, accepting only the levels of shade with monocultures for wood production does not suffice
Both examples below were less than 30 metes of each other





The native forest ecosystems have been fragmented and impacted with increasing frequency leading to the loss of species and restriction of gene pools.

Compounding critical loss

- The recent exponential rise in practice of ‘destructive sampling’ compounded by the phenomenon of taxonomic splitting. If practiced in a very restricted community, could lead that species to extinction.

- in a world of rapidly shrinking habitats the value of destructive sampling has to be questioned

- rare or isolated species populations must be recognised as ‘critical’ where studies on ‘molecular taxonomy’ is discouraged.

Responses to Critical Loss

- Reforestation is critical, but in which way can it replace what was lost?
- Annual aforestation rate 10,307 Ha but with what ?

Future indicators of development in forestry

- A discipline that seeks to understand the forest as an ecosystem.
- That researches the values of forest ecosystem services.
- That designs for more than the optimum output of wood.
- That accepts the value of a forest to rural or indigenous communities and vice versa.
- That uses biodiversity as a performance indicator
- That understand the role of forestry in restoration needs
- That develops modalities to capitalize on the Ecosystem Services of a forest

The vision required of future ‘foresters’

The forest, is inseparable from trees, their associated organisms and its ecological history. Indeed the forest as an organized system provides products and Ecosystem Services that cannot be provided by any individual tree. Forest water and forest biodiversity are two good examples of such Ecosystem Services.

Ecosystem services.. maintain the conditions for life on Earth. (UNEP)

What Creates Ecosystem Services (ES)

Ecosystem Services (ES) comes from the activity of life (organisms) on the environment. Some examples are, Cooling, Cleaning Water, Creating Clouds and rain, Provision of Oxygen, Sequestering Carbon Dioxide.

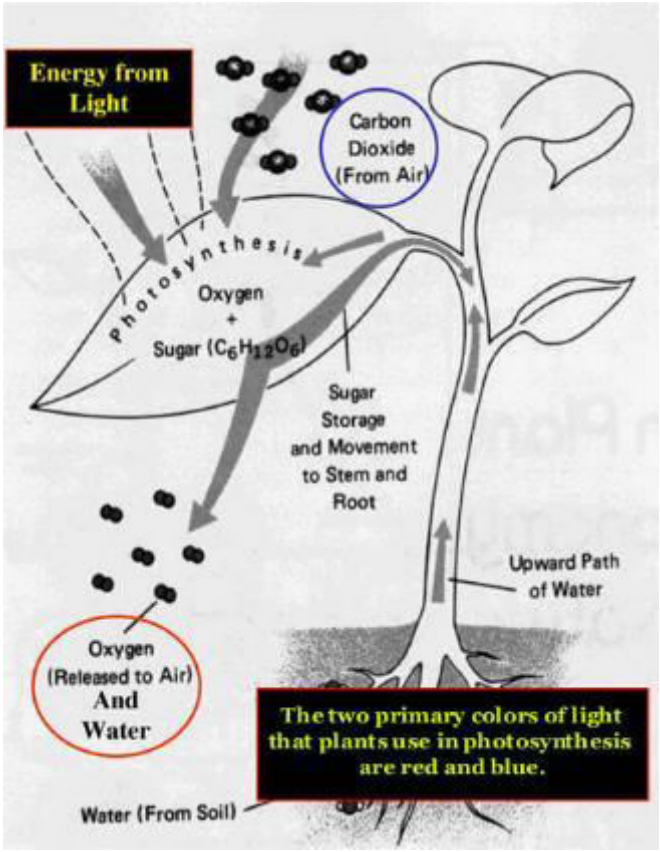
The presence of life (organisms) is clearly identified and measured by its biomass and biodiversity. The activity of cycling biomass, creates the patterns of biodiversity and generates Ecosystem Services

All biomass is created by a special component called Photosynthetic biomass

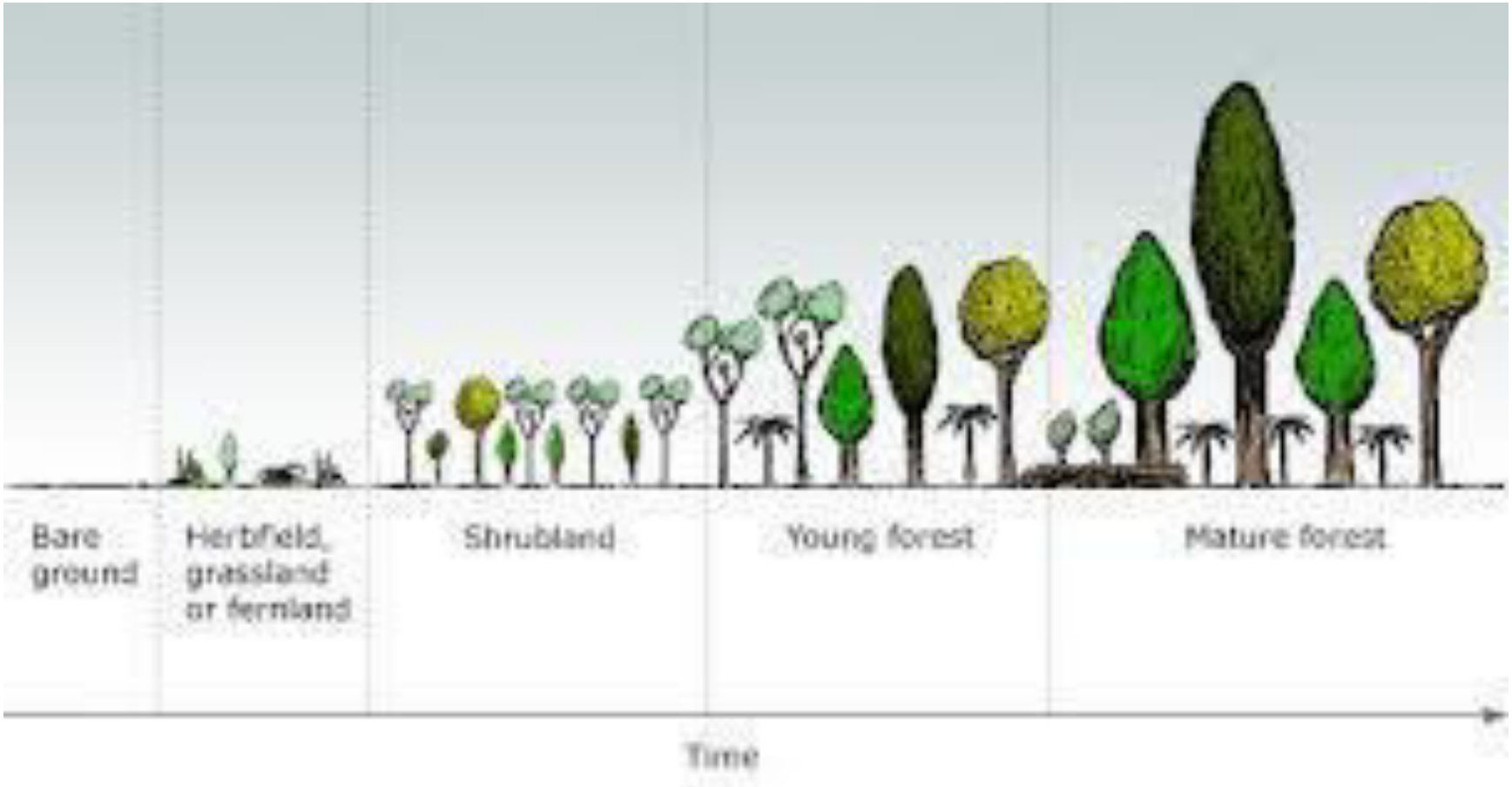
What has been forgotten in the rush to fix carbon is that it is the process that binds solar energy into a long lived, usable form. It is the use of this energy, that powers much of the activity of life

- Light energy is absorbed by various specialized organic compounds in plants such as chlorophyll, which conduct the process of Photosynthesis

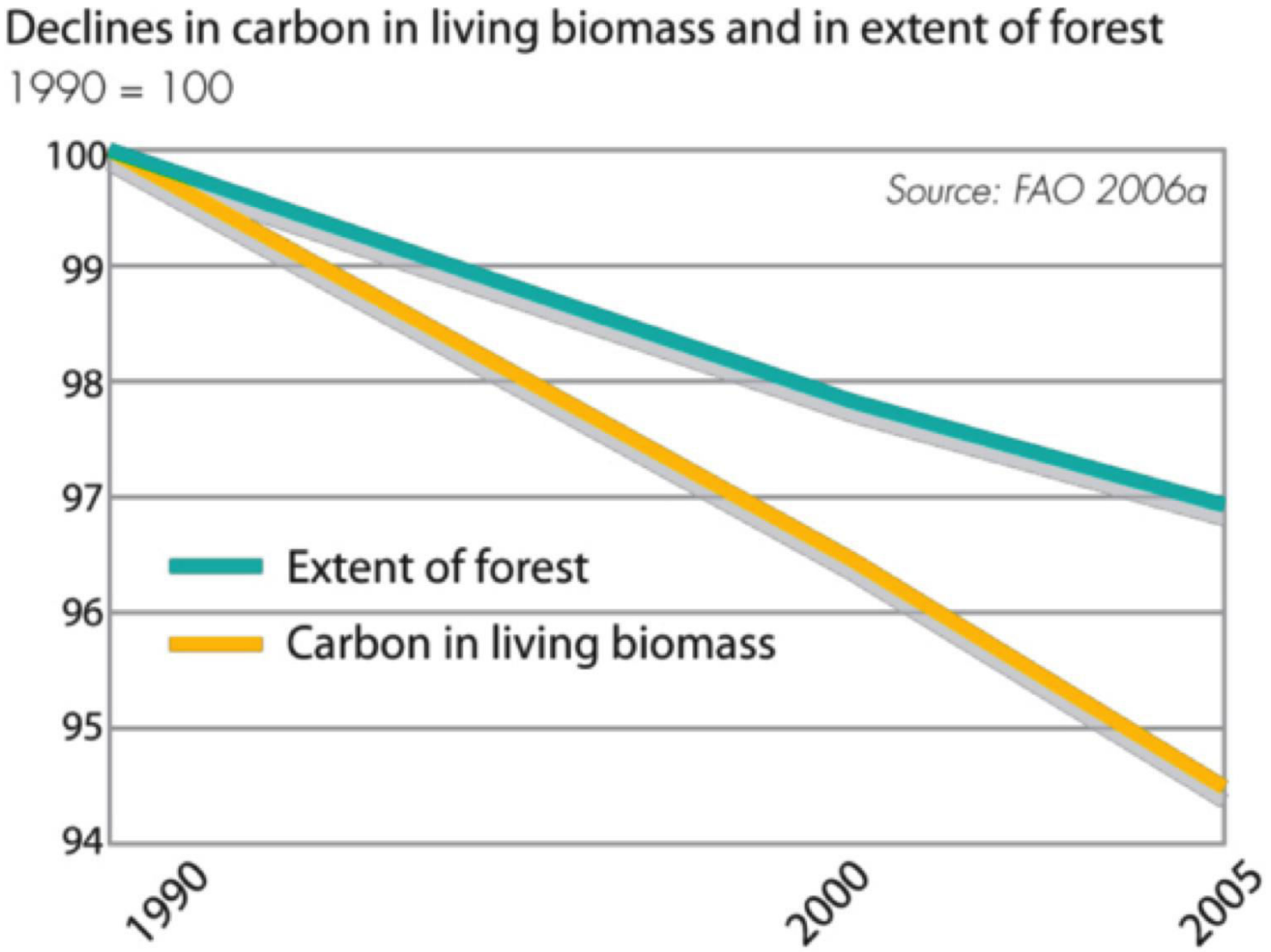
- **CO2+H2O + Sunlight -> Sugars + O2**



In nature the biomass that provides Ecological Services increases over time if undisturbed

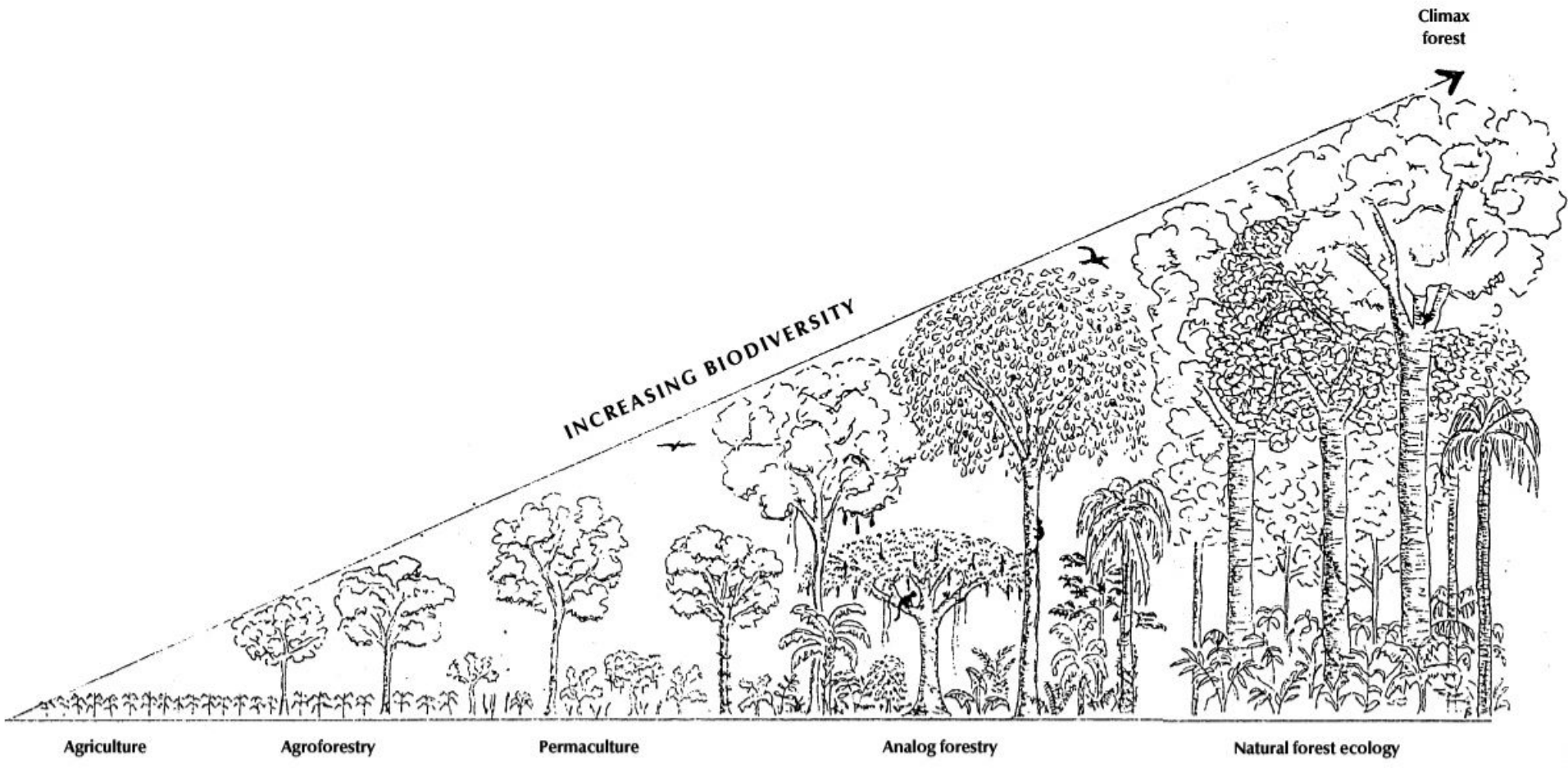


These are the drivers of the planetary life support system, unvalued to date and being lost at an exponential rate



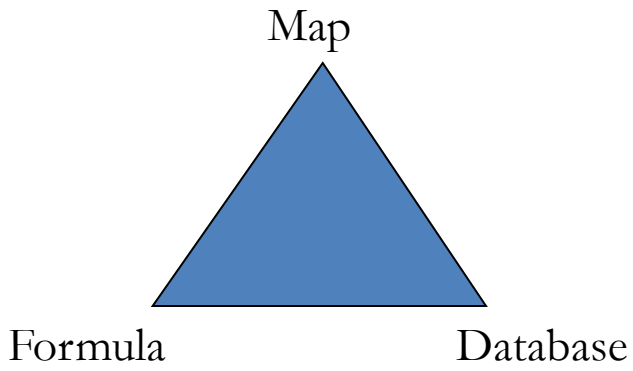
The loss of living biomass in Amazonia

Maximization of Photosynthetic Biomass as indicated by Biodiversity



What is Analog Forestry ?

Analog Forestry is a silvicultural system that seeks to create a tree-dominated ecosystem that is analogous to the original mature ecosystem in architectural structure and ecological function.



Principles of Analog Forestry

- **Principle 1 Observe and record**
- **Principle 2 Understand and Evaluate**
- **Principle 3 identify levels of yield**
- **Principle 4 know your land**
- **Principle 5. Understand flow systems**
- **Principle 6 Reduce ratio of external energy in production**
- **Principle 7 Be guided by landscape needs.**
- **Principle 8 Follow ecological succession**
- **Principle 9 Utilize ecological processes**
- **Principle 10 Value Biodiversity**
- **Principle 11 Respect Maturity**
- **Principle 12 Respond creatively**

www.analogforestry.org

Analog design on the left (90% exotic species) mimics the natural forest on the right(100% native species) with added aesthetic considerations and with similar volumes of Photosynthetic Biomass.

The Photosynthetic Biomass creates these critical Ecosystem Services

- Cooling,
- Cleaning Water,
- Creating Clouds and rain,
- Provision of Oxygen,
- Sequestering Carbon Dioxide.

A forest or any structure analogous to it, has the capacity to maintain the highest volume of photosynthetic biomass per unit area.

Example of its contribution to ***Global Cooling***

1 Tree = 10 AC units,
120,000 x 10 =
1,200,000 BTU /day, of ambient cooling.

450 trees /ac =
540,000,000 BTU/day of cooling.

1100 trees /ha =
594,000,000,000 BTU/day of cooling.

- By loosing 750,000,000 Ha of forest, we have since 1947 lost a cooling factor of over **445,500,000,000,000,000 BTU/day** at ground level.

Photosynthetic Biomass, cleans groundwater and cycles the atmospheric water reservoir (over 9010 GT/per photosynthetic cycle)

Mountain Forests

Contributing Cloud Condensation Nuclei (CCN)

(an increase in global albedo by 1-2% can diminish the warming effect of CO2 by over 50 years.)

The difference between live and dead clouds

Photosynthetic Biomass is the only production system that maintains the Global Oxygen Cycle

The creation and destruction of molecular Oxygen are in near equilibrium, but local concentrations will change radically in response to increased combustion or deforestation

However, the destruction of the Ozone in the stratosphere that is being felt today can be controlled by an increase in Oxygen production.

The increase of respiratory diseases in cities today is a direct result of lowering oxygen concentrations, as the levels of oxygen fall these diseases will increase radically.

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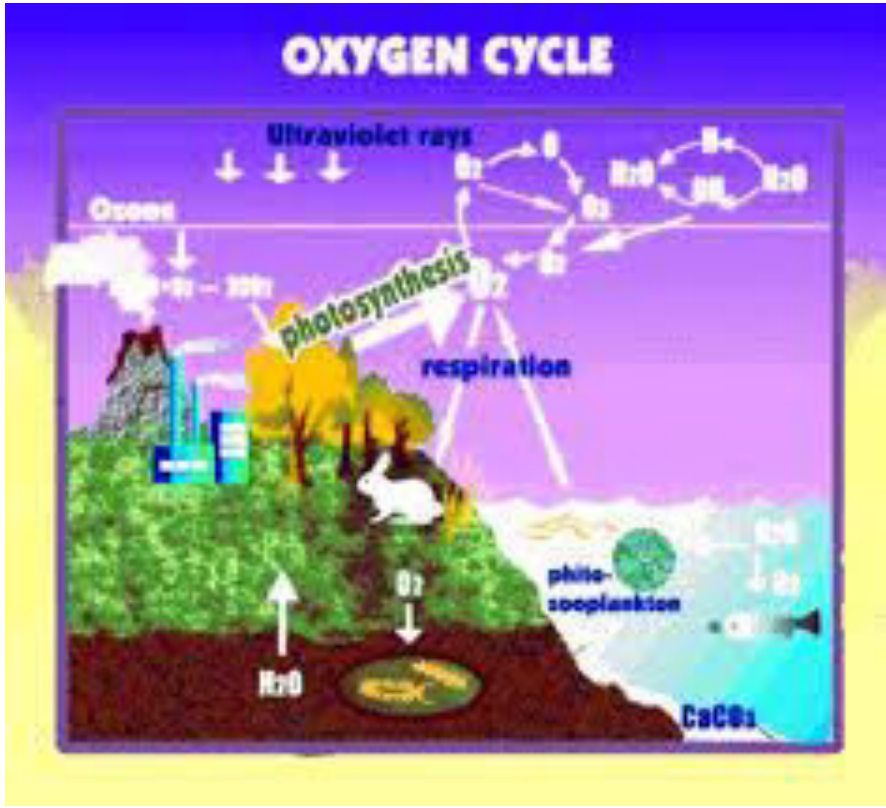

It is the leaves of plants that provide the Photosynthetic Biomass (PB).
that do all these Ecosystem Services

If we value the PB component, a forest can can conserve itself !

Our forest gardens will add to rural wealth through its PB component

Health Insurance between living in high PB situations and low PB situations

The gain in Ecosystem Services by generating Photosynthetic Biomass

Environmental

- Gain in Water Cycling services
- Gain in Global Cooling Services
- Gain in Carbon Cycling Services
- Gain in Biodiversity Conservation Services

Economic

- Gain in Sustainable Productivity
- Gain in product value
- Gain in Capital
- Gain in disposable income

Social

- Gain in relative independence
- Gain in social equity
- Gain in public health
- Gain in public contentment

IN THIS MANNER, FORESTS CAN BE RESTORED, AND ECOSYSTEM SERVICES CAN BE HARNESSED TO ALLEVIATE POVERTY, ECOLOGICAL, SOCIAL AND ECONOMIC

Thank you