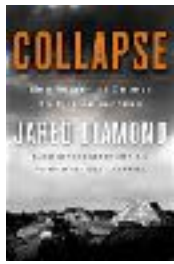
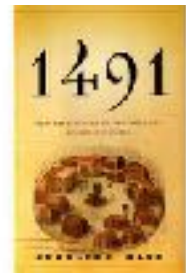


Permaculture In Haiti

Women & Children's Hope
Foundation



How do We Create a Symbiotic Future?



- With Growing World Populations and Dwindling Resources, both Finite and Renewable how do we create a Regenerative future for Millenia to come?
- Since starting to leave Africa 100,000 years ago we have primarily liquidated the earth's 2 Billion years of Natural Capital, resulting in deserts (except where oceanic created rain exists)
- Nature has succeeded in Resiliency and Regeneration through thick and thin for 2 billion years
- So how do we Model Society after Nature's Success and create Symbiosis with Planet Earth?
- This is Where Permaculture Comes in...

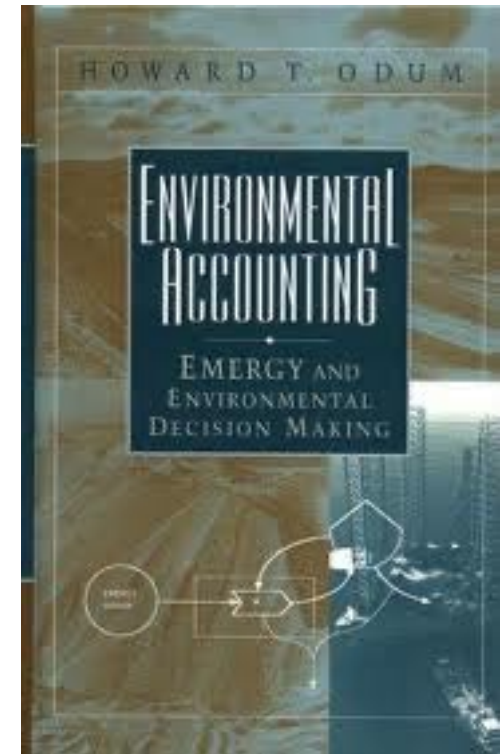
However, The shift from Carbohydrates to Hydrocarbons



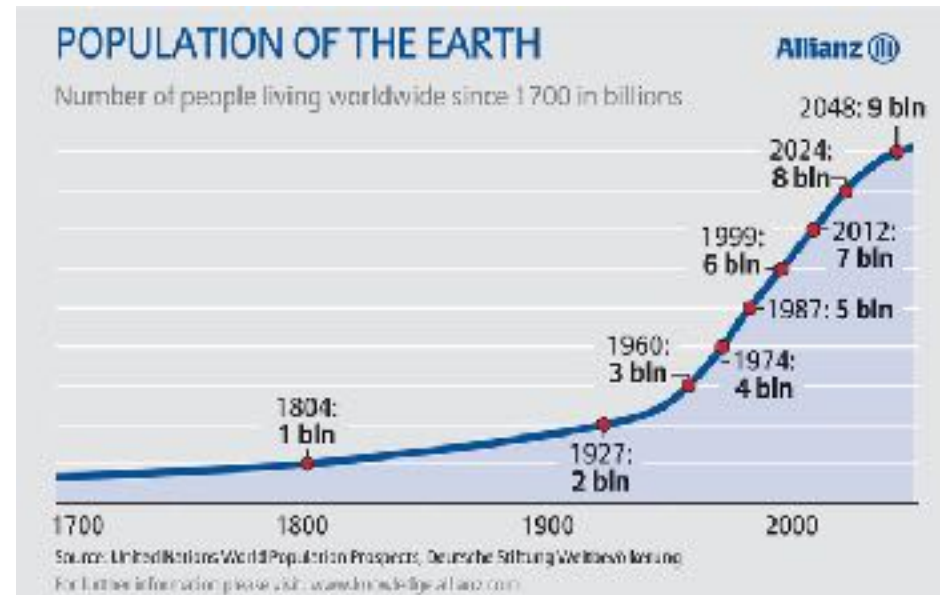
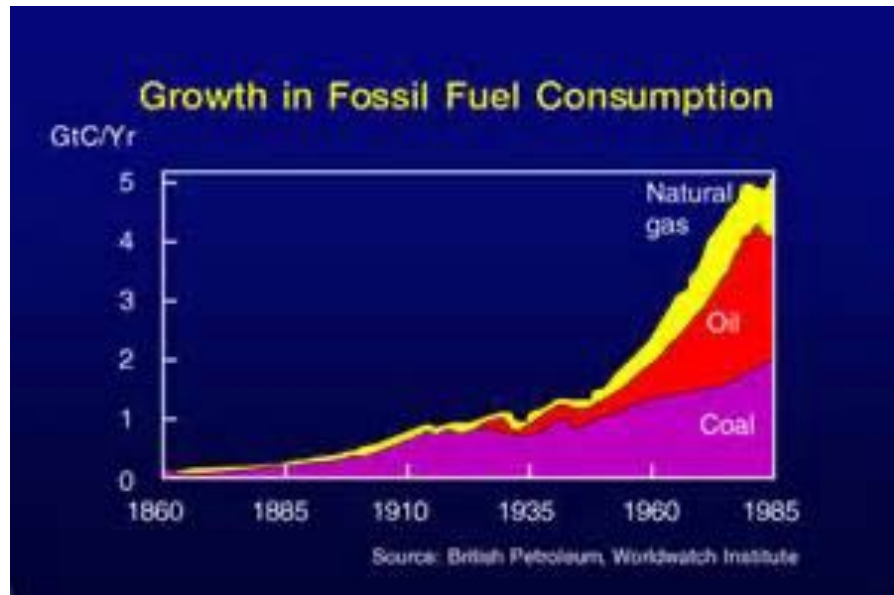
- Our Culture is defined by Energy Consumption
 - 86% of all energy is derived from Fossil Fuels (2001) (184 million barrels/day or **37,000 yrs of solar gain/day**)
 - 500 Man hours in 1 Gallon of Gasoline
 - This allows us to do 70x more work than we could on our own in America
 - How do we design society so we can do more with fewer hydrocarbons
 - Globally we consume 400 quadrillion Btu/Yr.
 - This has resulted in a major focus on Fossil Fuels throughout our Foreign Policy

Net Energy Economy

- H. Odum: Emergy accounting
- Quantifies Energy invested from all inputs including ecosystems & sun to create energy
- Energy in vs. energy out (energy payback)
 - *“Environmental Accounting: EMERGY and environmental decision making.”*-book
 - Seen as the benchmark for Global energy acc.



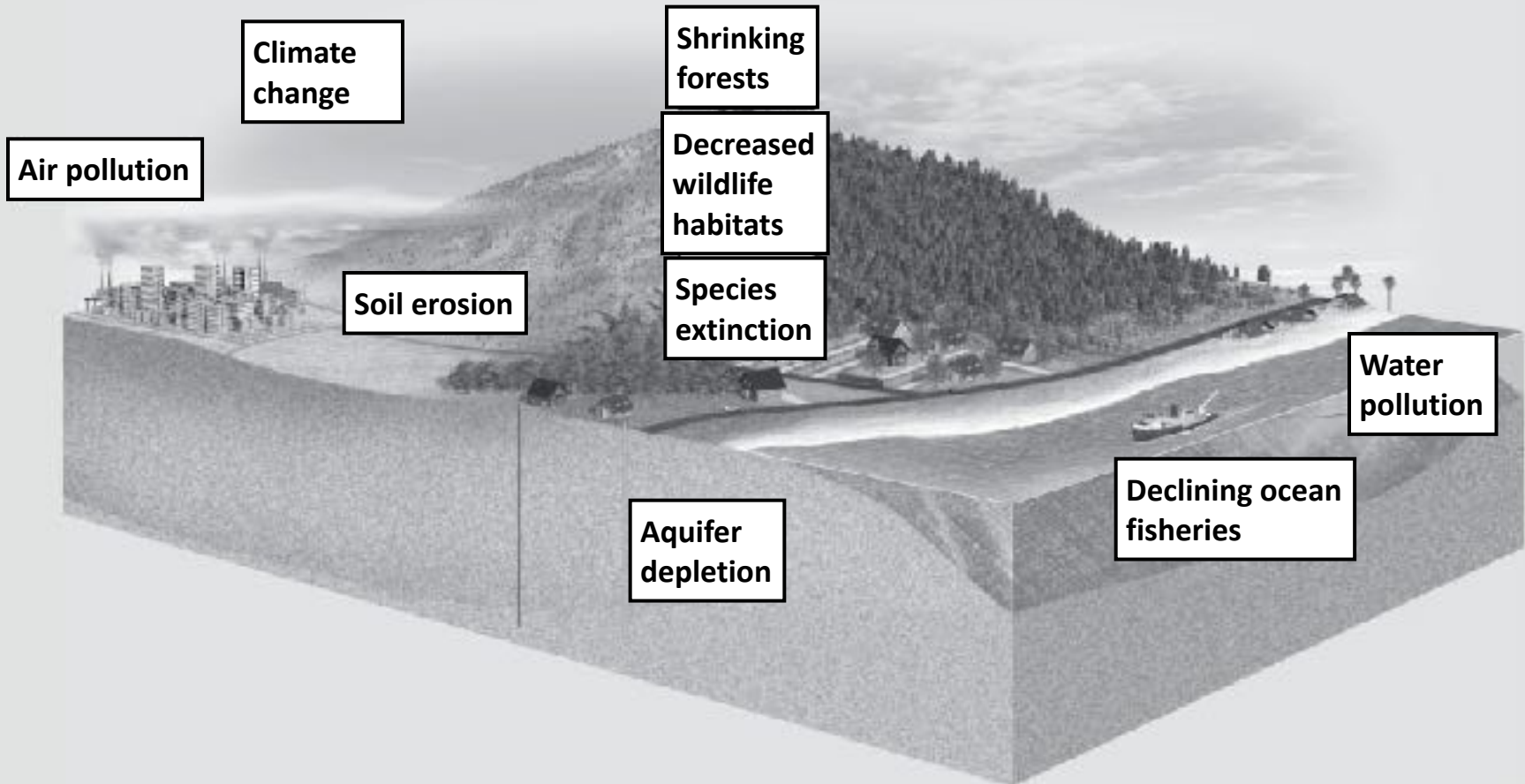
Exponential Growth & Desertification: Accelerated by Fossil fuel



- Managing Population Growth is critical for stability
 - an ethic of 1-3 children per family should keep us stable

The Result: NATURAL CAPITAL DEGRADATION

Degradation of Normally Renewable Natural Resources



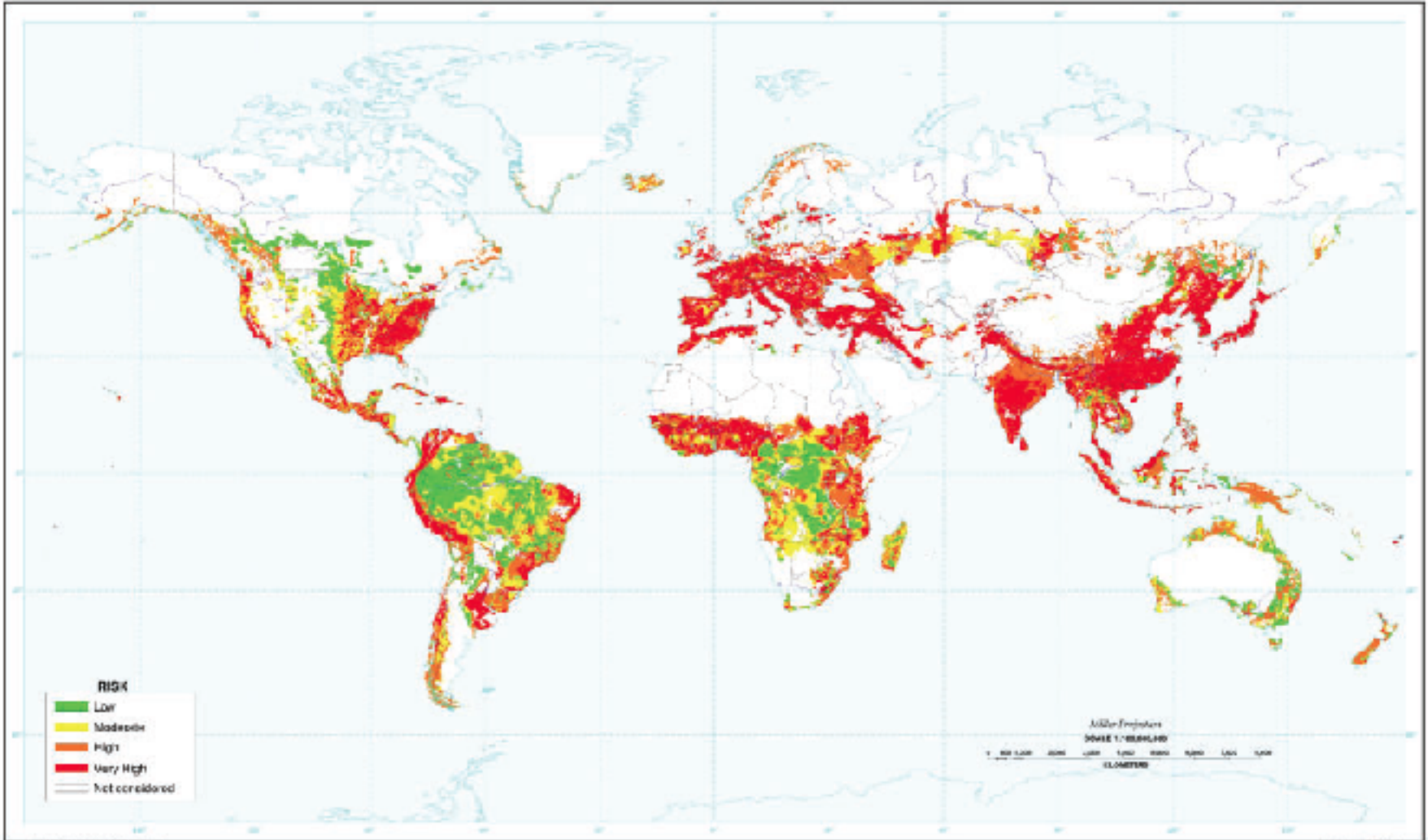
The Results of Industrial Farming

- Soil Erosion
- Energy Loss due to Fossil Fuel Inputs:
 - 10 Calories of Fossil Fuel for 1 calorie of Grain
 - 40 Calories of Energy for every calorie of Beef
- Water Loss and Soil Salting Due to Irrigation
 - Especially in Dry Climates
- Monocultured crops that are susceptible to Disease and Pests
- Pesticides and Herbicides causing Health Problems

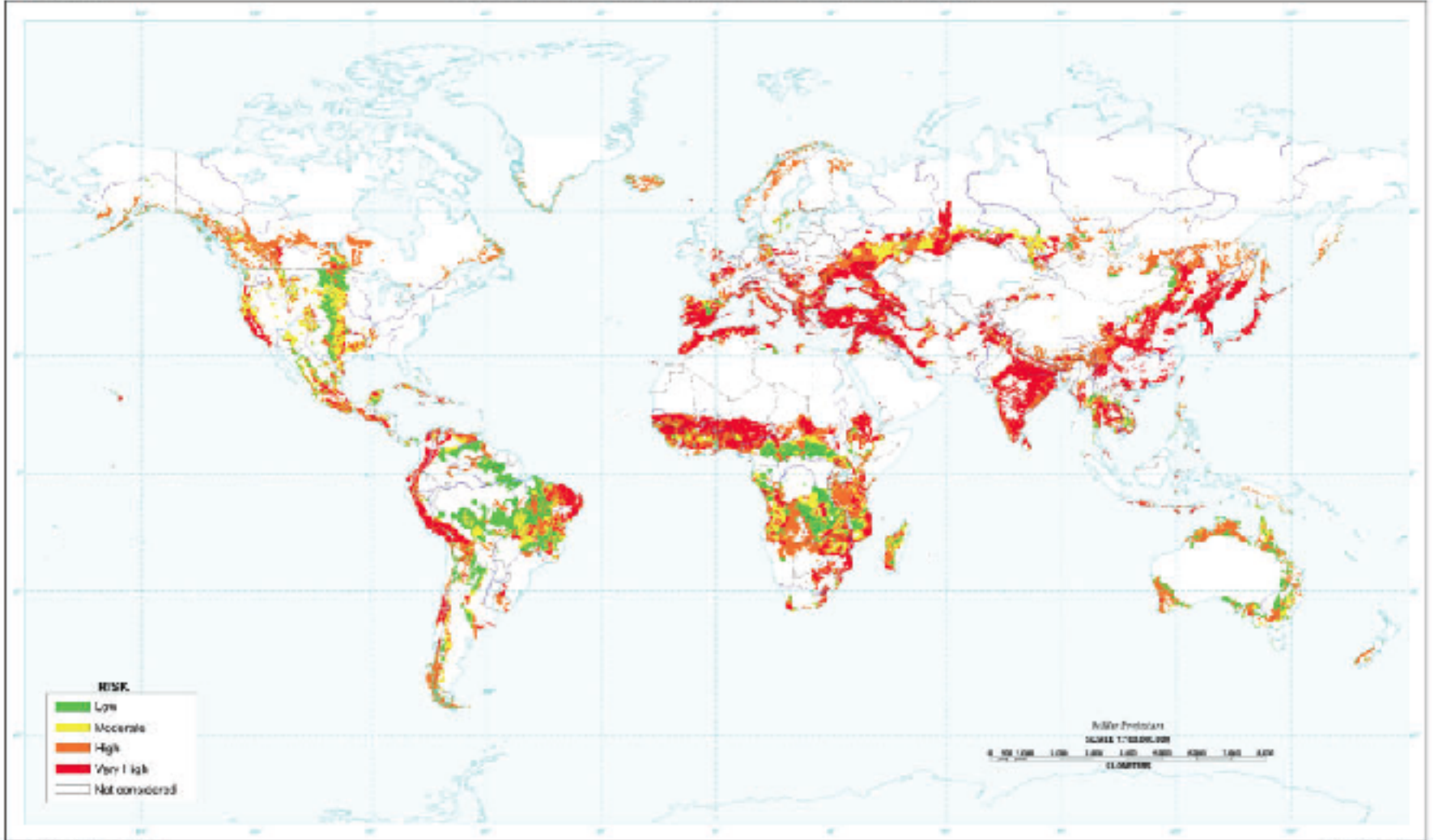
Rand Corporation Soil Erosion Study



Risk of Human Induced Water Erosion



Risk of Human Induced Wind Erosion



Global Challenges within Haiti

- Population: .6 Acres per person in Haiti of all arable and un-arable land
- Minimal access to Energy or Renewable Energy and its ability to advance society
- Renewable Resources badly degraded due to mis-management



Rainforest Remnants 150m away from completely eroded land caused by 100 years of mismanagement


The Foundation of Civilization is Farmers, the Foundation of Farmers is Soil



Fondwa Region Soil Erosion: Up to 2 meters during the life of mango



Some Solutions: The Land Institute



**Perennial rice:
Oryza sativa x *O. longistaminata***

**Yunnan Academy of Agricultural Sciences
Hu Fengyi, YAAS, project leader**

Ecological Succession

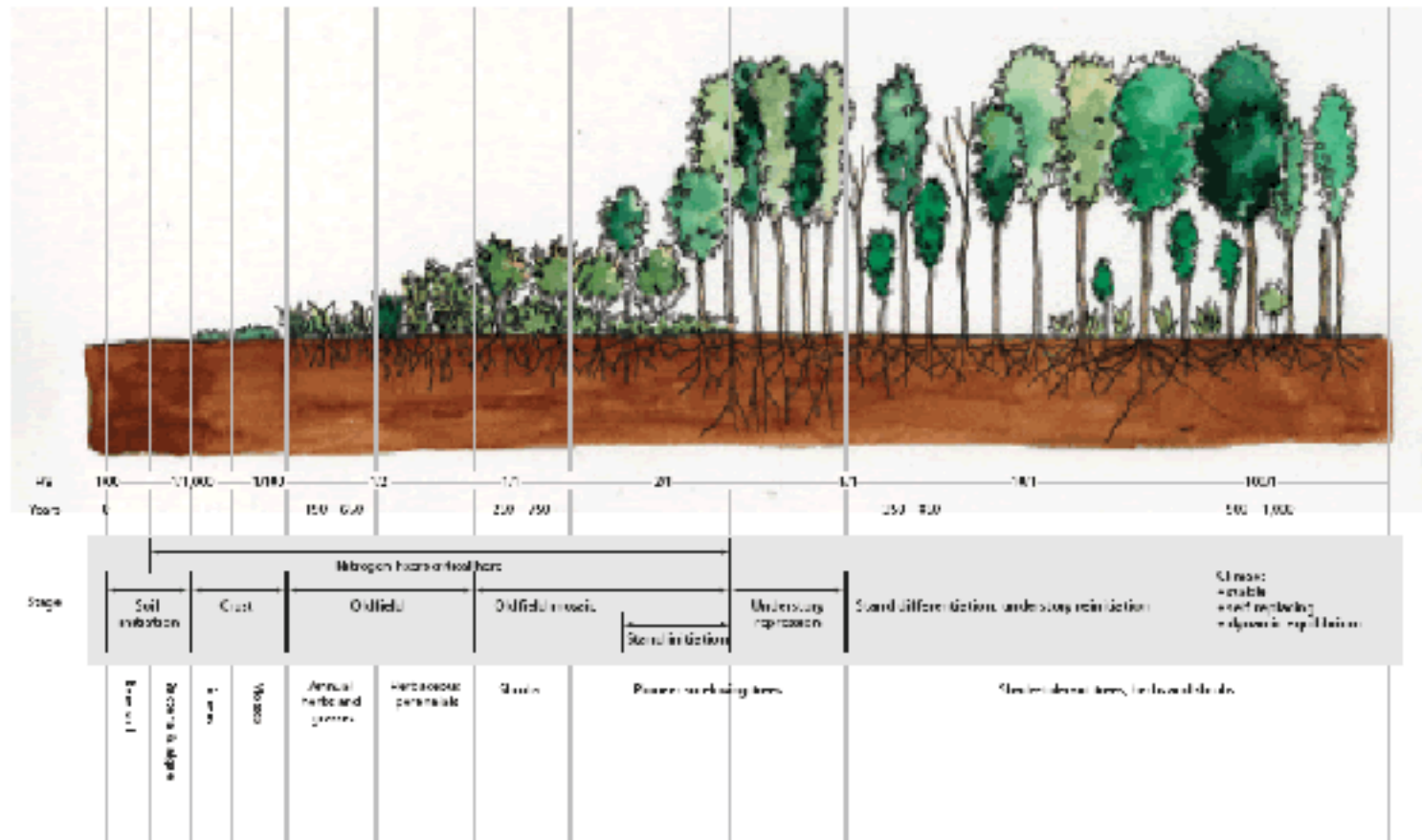
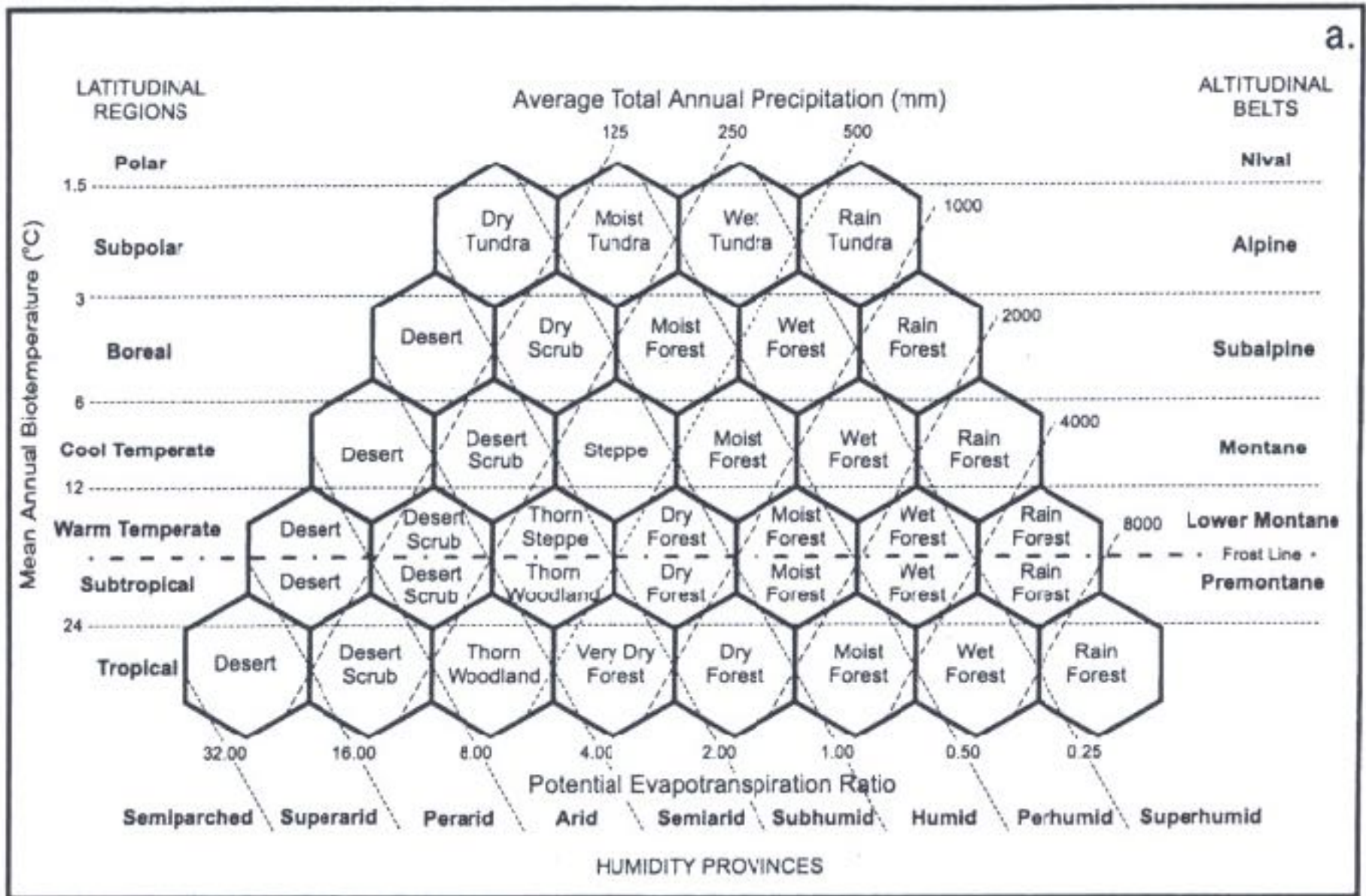
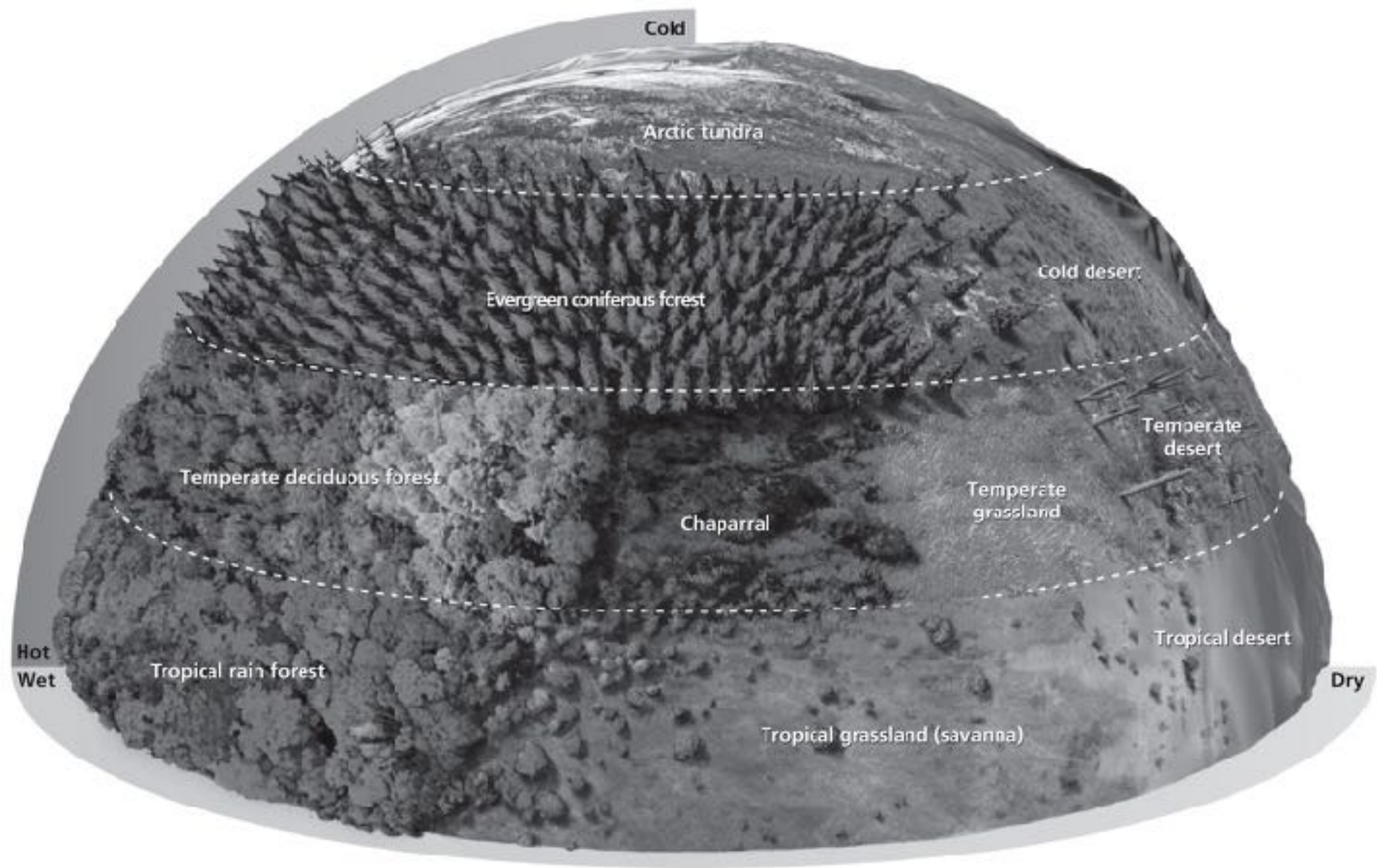


FIGURE 6.1. Primary linear succession to climax involves progressive soil and community development from bare, lifeless earth to climax forest containing a rich variety of organisms. Open circles indicate sun-loving species, dark circles shade-tolerants. Secondary succession involves a disturbance that cycles the system from somewhere along the successional continuum back to any earlier stage except bare, lifeless earth. If the system starts with bare earth completely lacking in legacies from earlier living systems, it is a primary succession.

Climates & Ecosystems on Earth





Ecological Production Potential

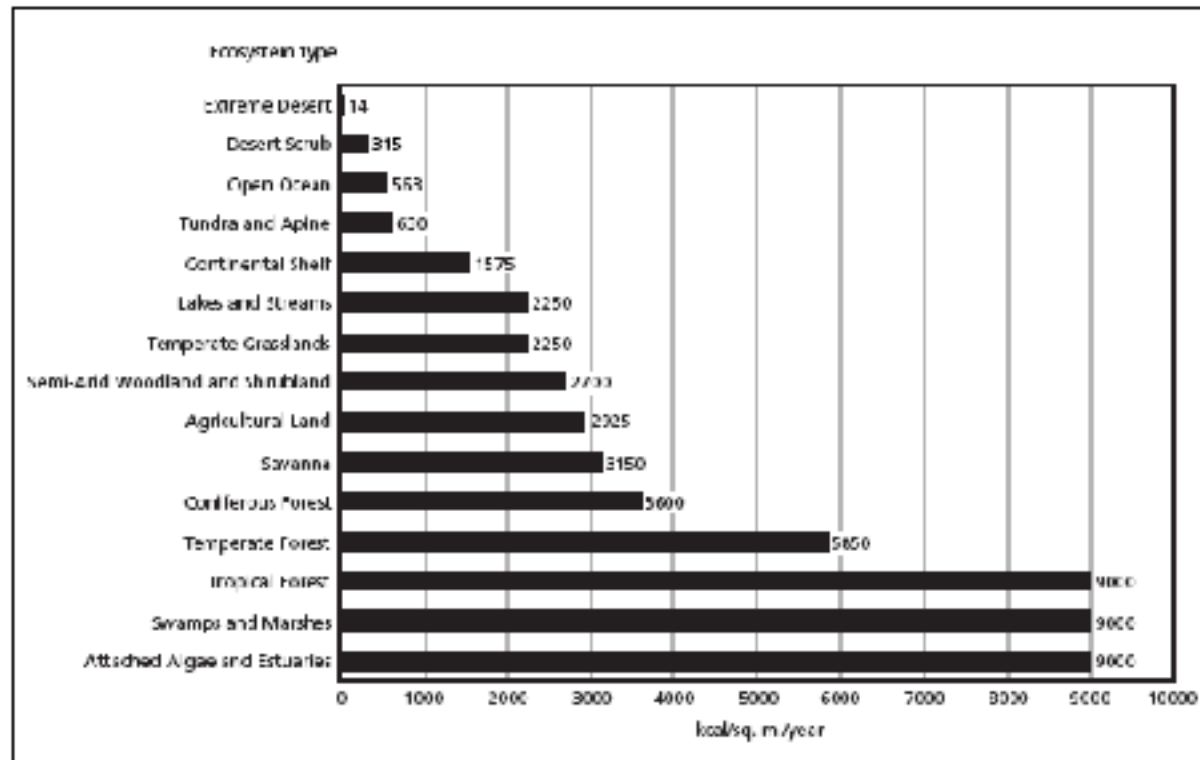
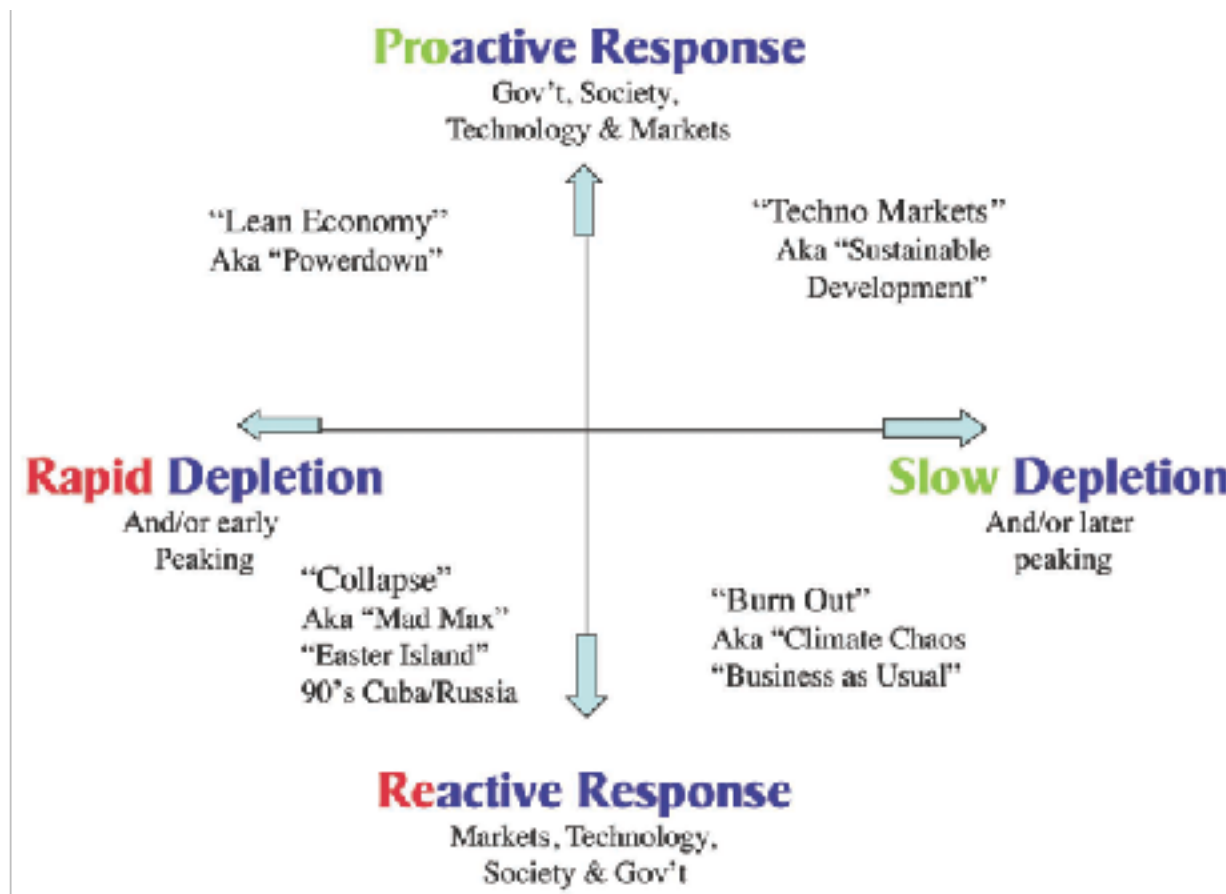


FIGURE 2.2. The net primary productivity (NPP) of different ecosystems on planet Earth. The numbers after the bars represent the amount of solar energy converted to biomass in thousands of calories per square meter per year ($\text{kcal}/\text{m}^2/\text{yr}$). Notice that agricultural land captures only half the energy of temperate forest, and less than savanna. Woodland and shrubland here refers to communities limited by aridity to such open habitats, not mid-succession in humid, temperate climates. Adapted from *Kornfeldt, 1976, data from Whittaker, 1970*.

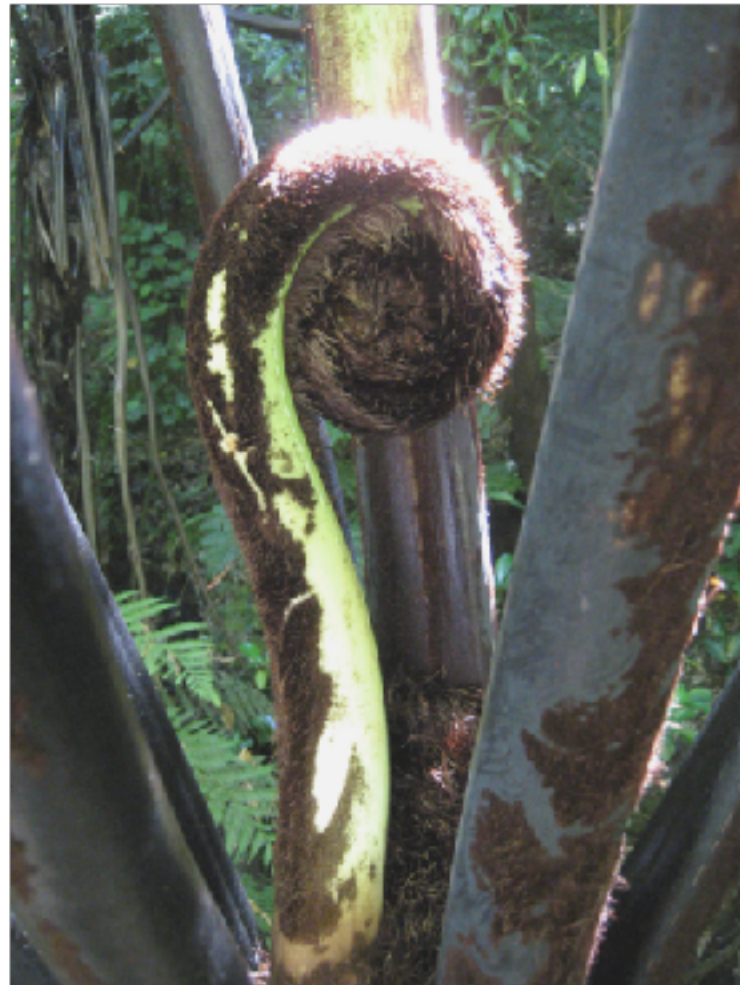


THE FUTURE

Adapted from the Transition Handbook

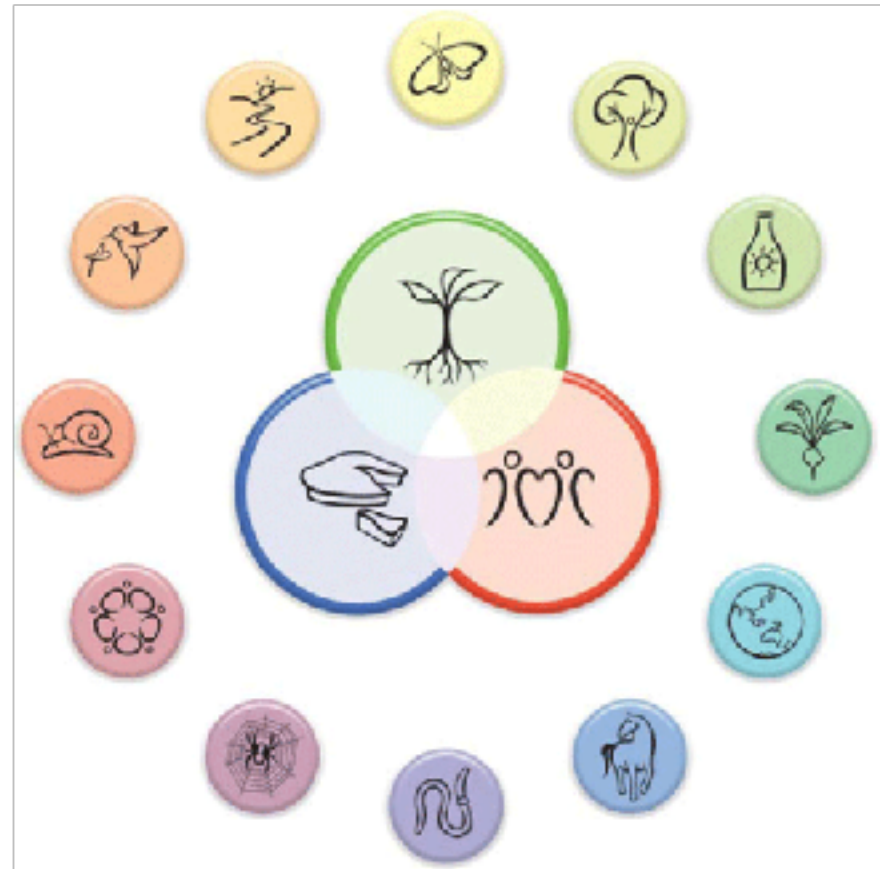
EFFICIENT, RESILIENT DESIGN

PERMACULTURE IS A DESIGN SYSTEM MODELED AFTER
NATURE'S 2 BILLION YEARS OF SUCCESS



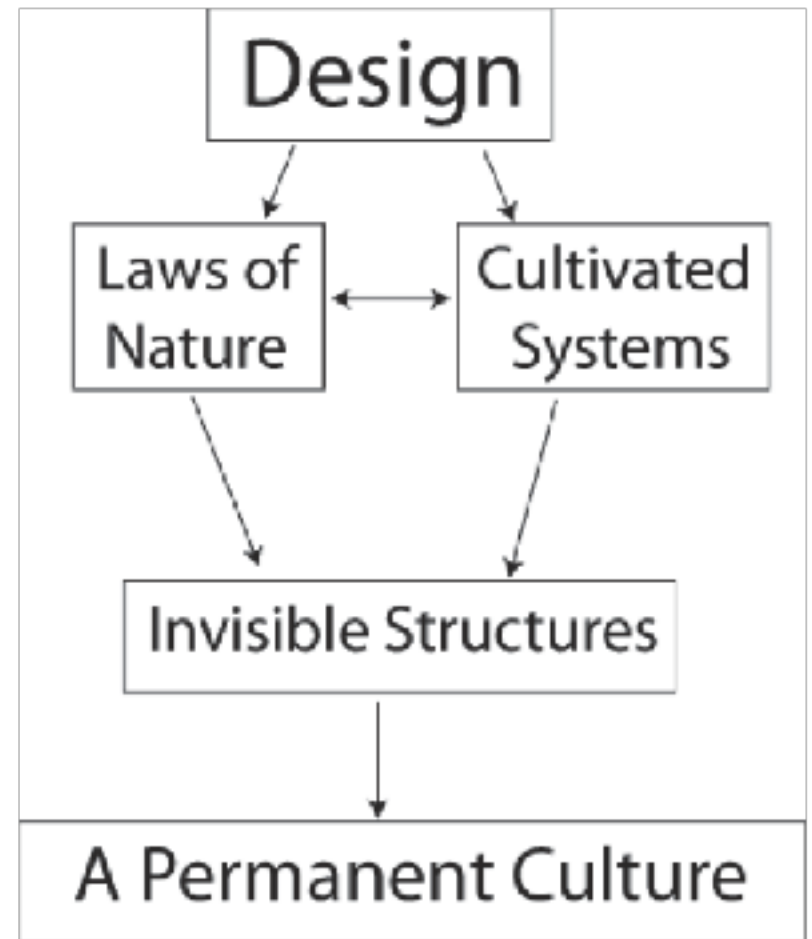
THE 3 ETHICS

Earth Care
People Care
Fair Share



CREATIVE PROBLEM SOLVING

Permaculture is a
Design Science,
Utilizing the Scientific
Method filtered
through the lens of
Regenerative systems
to resolve problems.



THE GOAL

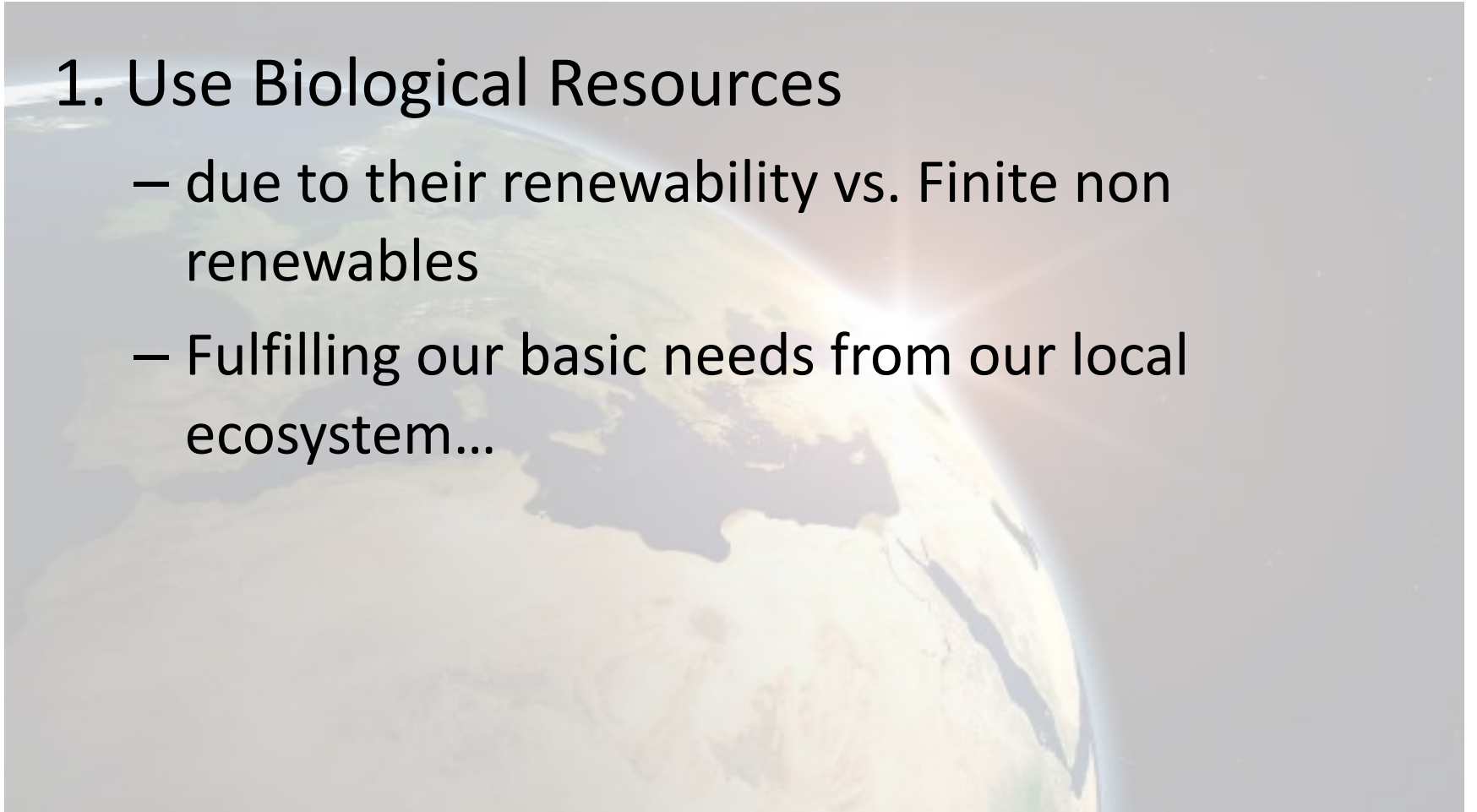
- To fulfill our needs in a way that enhances societal stability through ecological stability
- What are our needs?
 - * Food
 - * Water
 - * Foundations (Houses)
 - * Fuel
 - * Fiber
 - * Pharmaceuticals
 - * Fertilizers
 - * Fodder (Animal & Educational)
 - * Family & Friends
 - * Fun
 - * And then Flourish!



Mollison's Permaculture Principles

1. Use Biological Resources

- due to their renewability vs. Finite non renewables
- Fulfilling our basic needs from our local ecosystem...



2. Integration: Everything is connected to Everything else



Moroccan Food Forest

3. Multiple Functions for each Element



4. Redundancy: Many Elements (diversity) for each Function (shade)



Diversity is related to stability. However, it is not the number of diverse elements you can pack into a system, but rather the *useful connections* you can make between the elements

Zoo

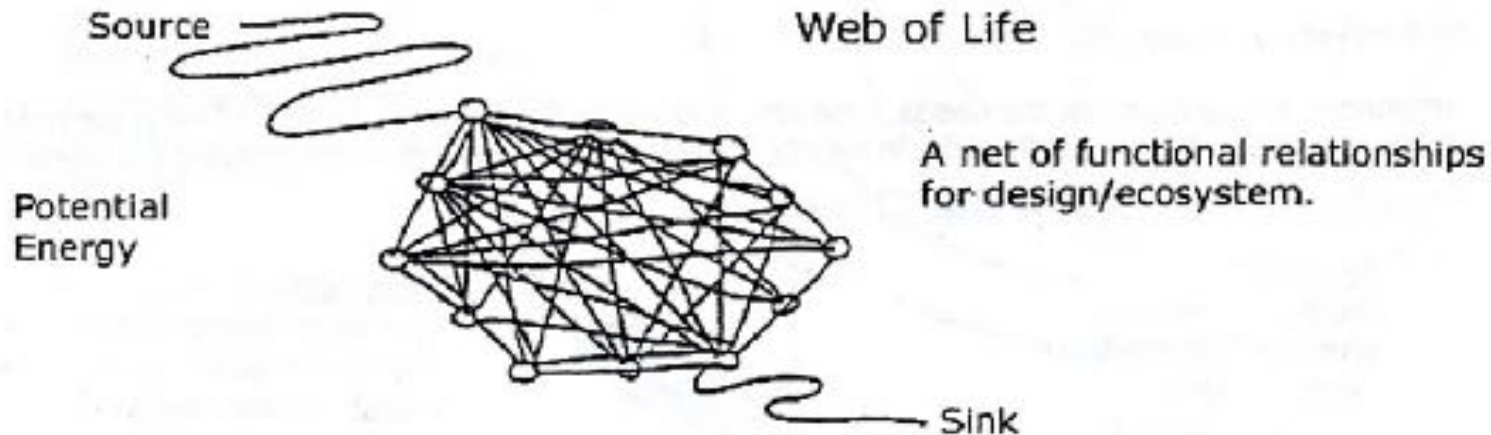
vs.

Forest

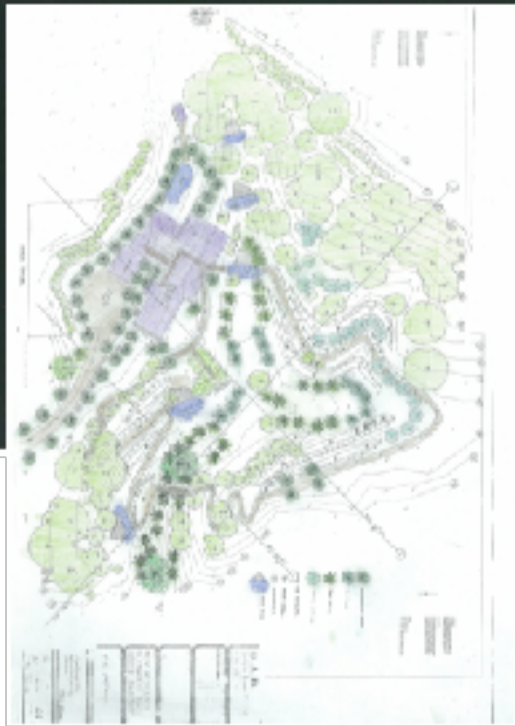


The Result :

Interconnection from Source to Sink



- Diversity Increases
- Energy Stores Increase
- Organizational complexity increases
- Goal: * Capture & Store Energy To Obtain a Yield



DESIGNS



WCHF Programs

- Sustainable Farming
 - Research: What Works, What Doesn't work
 - Farm Planning
 - Appropriate Farming for type of land
 - Appropriate Livestock for size of land
 - Water Management: Reforestation & Earthworks
 - Soil Management
 - Farm Design: Terracing, Perennial planting, Reforestation
 - Composting
 - Designed self renewing fertility: Legumes, Dynamic accumulators, Manure, Soil Microbiology
 - Livestock management: Fencing/Penning
 - Business Development
 - (First: Eco-Logical = Logic of the Home; Second: Eco-nomy = Home Management)
 - Diversify farm products for Economic & Ecological Stability
 - Annuals (Veggies, Staples);
 - Perennials (Fruits, Nuts, Fodder, Timber, Fuel Wood, Compost);
 - Livestock (Food, Soil Fertility/Compost, Plant Management)
 - Seed Saving: Adapting Crops to Fondwa
- Family Planning



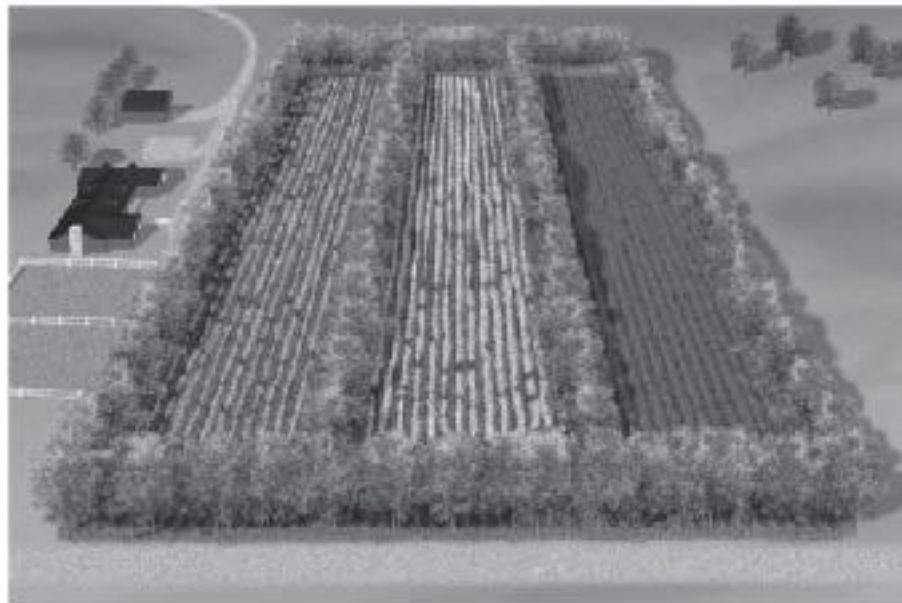
(a) Terracing



(b) Contour planting and strip cropping



(c) Alley cropping



(d) Windbreaks

FPF Research Site: Researching Soil Preservation & Creation



A Frame Level, Terraces & Water Management



FPF Research Site: Terracing Bedrock



6 Months Later



Fencing Research Site



6 Months Later



Penning Livestock and introducing better livestock with Heifer

- Better Fodder Management
- Better creation of Compost
- Acceleration of Reforestation
- Increased Income due to superior breeds



Polyculture Research

- Increase production through intensive Design and management
- Niches to fill in development & research
 - Overstory, Understory, Shrub, Herb, Ground Cover, Root, & Vine Layers
 - Producers, Fertilizers (Legumes, Etc.), Beneficial insect habitat, Food for Pollinators, Aromatic Pest confusers
- Livestock integration to acceleration nutrient cycling and increase production
- Benefits: Soil Preservation & Creation, Water Infiltration, Natural fertility cycles restored, Increased Rainfall, Increased Biological productivity to fulfill Haiti's needs

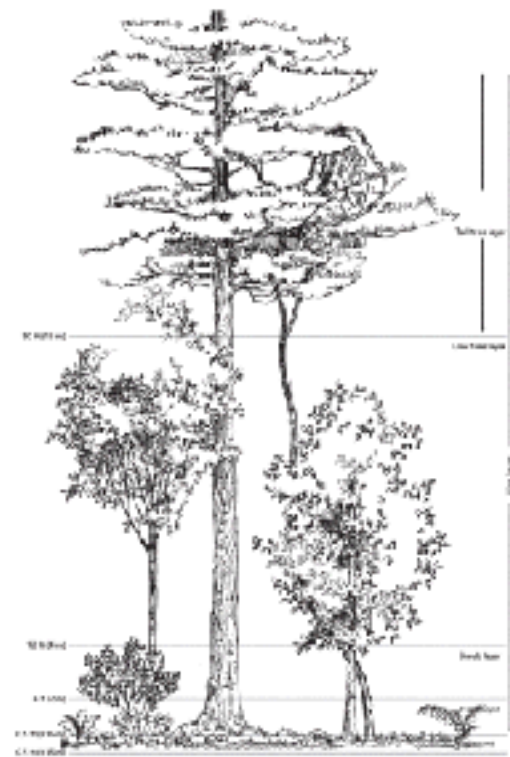


Figure 1. Polyculture system, Haiti

TABLE C1.2. Selected calcium accumulators and their accumulated nutrients.

Species Name	Common Name	Nutrients
<i>Acer saccharum</i>	sugar maple	Ca, K
<i>Allium schoenoprasum</i>	chives	Ca, Na
<i>Carya</i> spp.	hickories, pecan	Ca, K
<i>Carya ovata</i>	shagbark hickory	Ca, K, P
<i>Chamaemelum nobile</i>	chamomile	Ca, K, P
<i>Cichorium intybus</i>	chicory	Ca, K
<i>Cornus florida</i>	flowering dogwood	Ca, K, P
<i>Equisetum</i> spp.	horsetails	Ca, S, Mg, Fe, Cu
<i>Narthecium ossifraga</i>	watercress	Ca, I, Fe, S, Mg, Na, P, S
<i>Musa</i> spp.	plantains	Ca, Cu, Fe, K, S, Si

Existing Polycultures in Timo



Vegetable Gardens

- Fed from Animal Compost
- Better Nutrition
- Increased income
- Diversified Income



Women's Gardens

- Terraced Vegetable Gardens
- Aquaculture introduction – CODEP?



Appropriate Technology:

Reduces ecological impact and increases quality and cost of living

- Easily adoptable, reasonably priced, increases work capacity



Market Development/ Value Added

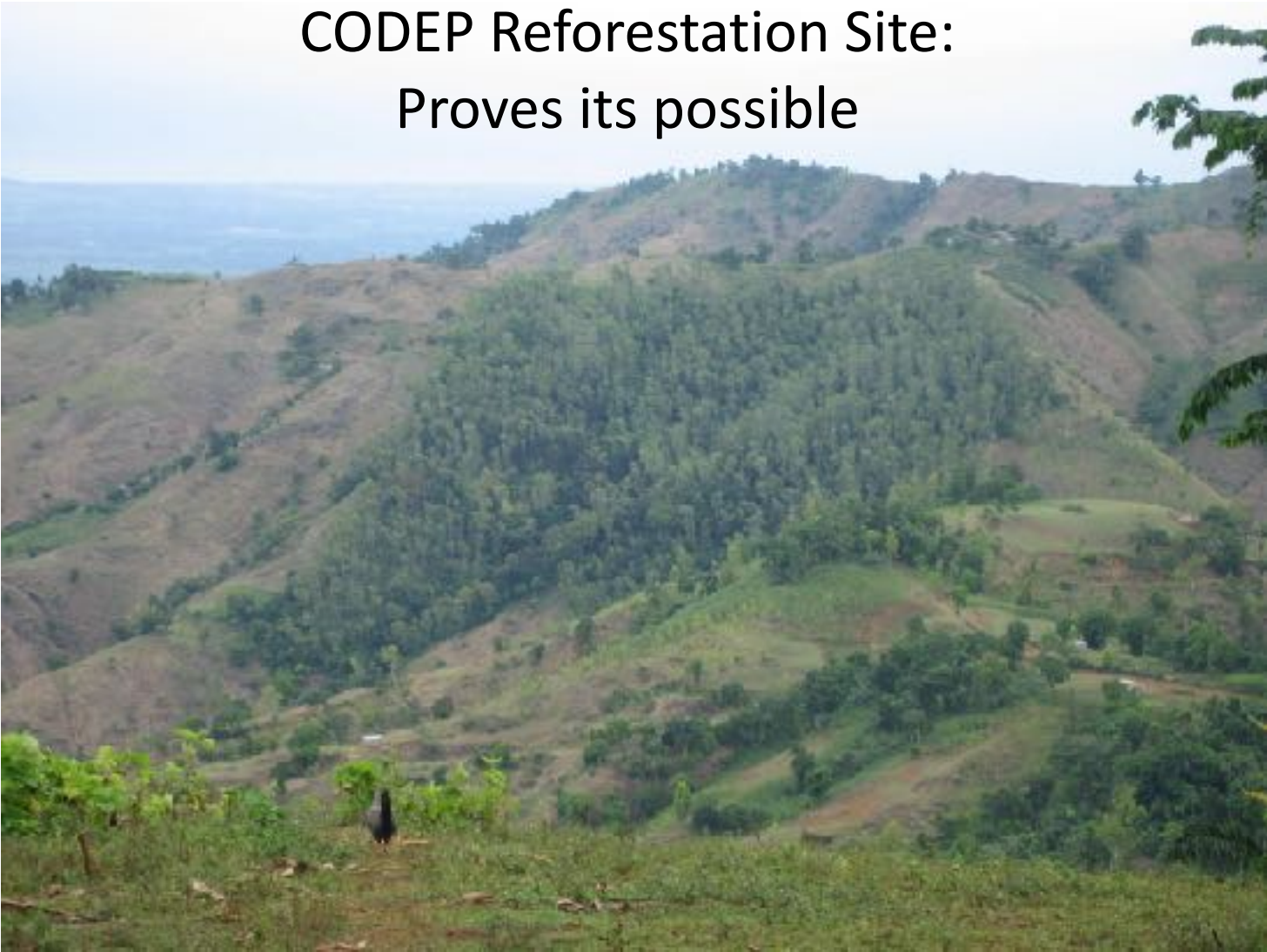
- Creates Economic Stability
- Increases income
- Increases market viability of diverse and currently underutilized crops
- Creates stable sources of Income throughout the year



Sites & Organizations we've learned from and seek to improve upon:

CODEP Reforestation Site:

Proves its possible



However, how do we get a farmer to go from this to that without the cost of leasing land for 10 years?



That's WCHF's Goal through utilizing diverse integrated techniques

How do we reforest with Animals?



Permaculture's Proven record



Lasagna Garden

1 growing season

The more creative we are with our yields the more diversity, stability, fertility and thus designed resilience we get out of the system

Refinement of Program

- Crop/Livestock Production & Market Research
 - Propagation and breeding Techniques
- Research & Refinement of Diverse Polycultures for 4 types of slopes
 - 0 - 3 Degrees: Alley Cropped
 - 3 - 30 Degrees: Terraced
 - 30 - 45 Degrees: Contour Perennial Farmed, **NO Tillage!**
 - 45 Degrees +: Reforested
- Comprehensive Economic Farm Planning & Designs
- Carrot & Stick Farm implementation plan for Transition to Polyculture Perennial systems
 - Heifer livestock and training, Vegetable Garden Training, Compost Training, Seed Cooperatives, Perennial Nursery Stock
- Demonstrations as exemplified in Timo and region



(a) Terracing



(b) Contour planting and strip cropping



(c) Alley cropping



(d) Windbreaks

Alley Cropping: Flat land



Mars Inc. Soil & Water Regeneration, Hillside Restoration, Tree Crops



2005



2006



2007

50% Cacao + Shade Species, Tree Crops & Cash Crops



Year 1

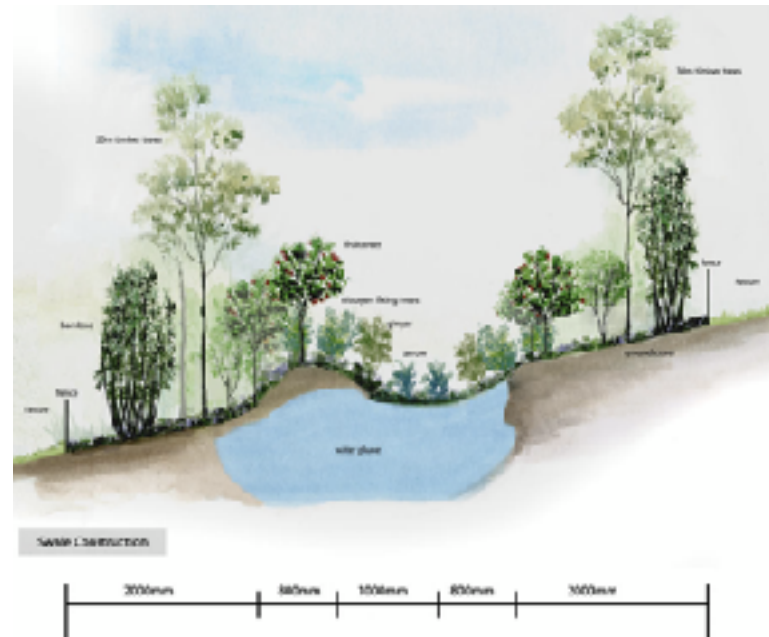


Year 2

Terraces: 3-30 Degrees



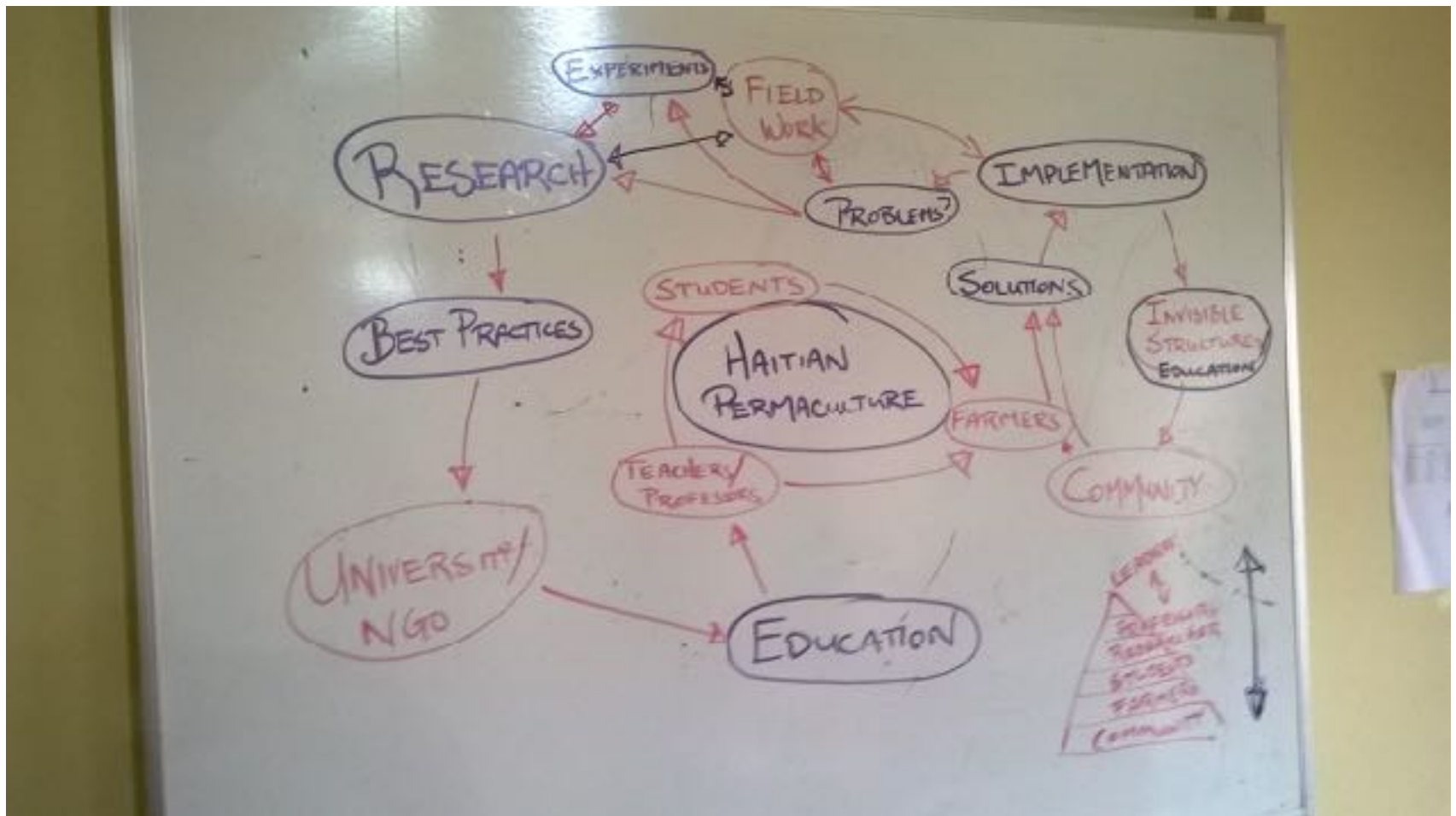
Contour Farming 30-45 Degrees



Re-Forest with productive species: Over 45 Degrees



The system of Haitian Permaculture Development



Expansion of Program

- Collaborations with Universities & NGOs
 - Permaculture/Agro-Forestry Education in Schools
 - Students for regional Field research & Implementation
 - 1st & 2nd Year students: Crop Research
 - 3rd & 4th Year Students: Assisting Farmers to design & Transition their farms to sustainable methods
- Regionally Appropriate Demonstration sites for education and research
- FPF Community Center & research sites to host students for field research
- Similar to US Land Grant Universities, Research Stations & Extension Agents working with farmers in the field
- Funding: UN, EU, USAID, Clinton Foundation, Kick Starter