

Measurement/Quantifying Tropical
Agroforestry Systems

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Agroforestry Systems

A Presentation for the Trees for Improving
Profitability, Sustainability and Resource
Conservation on Farms and Ranches Workshop

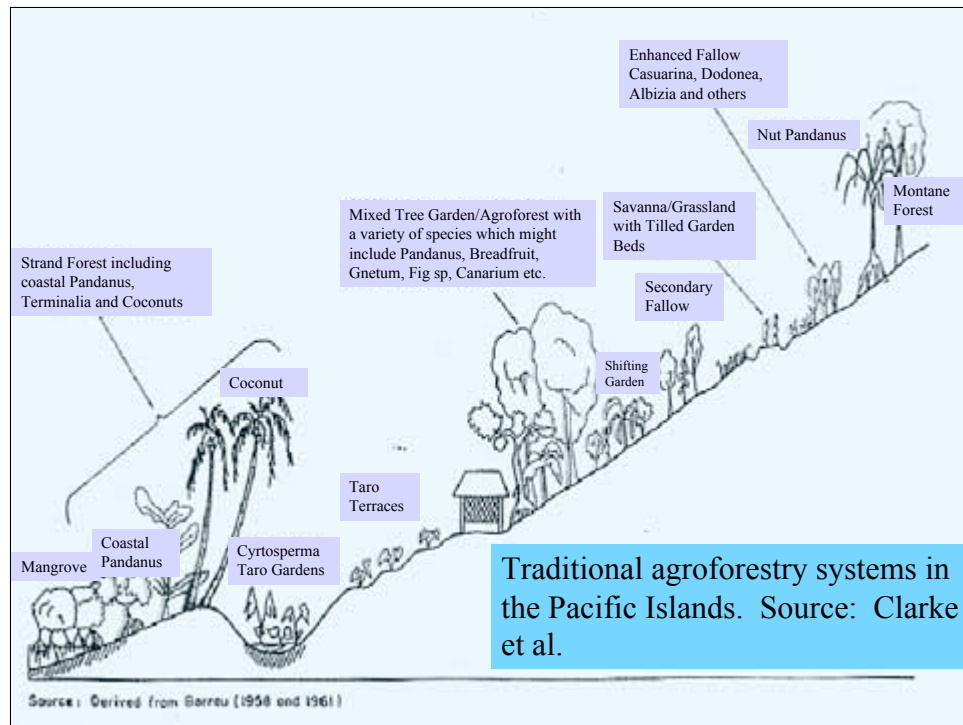
Koror, Palau and Hagatna, Guam
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The Nature of Traditional Pacific Island Agroforestry Systems

A major problem in quantifying traditional agroforestry systems is the diversity and complexity of the systems commonly used in the Pacific Islands...

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Within a traditional agri(cultural) system, often there is more than one system of cultivation.

Dependence of any one system varies from place to place, as affected by natural, geographic/ecological and socio-cultural factors.

The species and varietal diversity of traditional systems is high: Many systems are polycultural containing a wide range of species and varieties which differ in ecological requirements have different life cycle strategies.

Examples of traditional agroforestry systems in the Pacific Islands are seen in the following slides....

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Upper left: Intermittent garden (swidden), Rotuma, Fiji.

Lower left: Three months old intermittent garden, with an older 1.5 year garden in the background. Kompiai, PNG. 1972.

Above: Colocasia and Cyrtosperma taro in a Mokilese intermittent garden at Sokehs, Pohnpei, 1992.

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Mixed Tree Garden. Left: Taga, Samoa. Right: Pohnpei

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As seen in the previous slide, traditional agroforestry is embedded within the structure and functions of its natural and cultural environment. Full understanding of these systems must recognize their ecological and socio-cultural frameworks.

Additionally, the reasons for traditional agroforestry is often different from western reasons. Examples: yams in Pohnpei and taro in Palau.

What are some of the differences between traditional agroforestry systems and western agriculture?

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Here are a few:

Differences Between Systems of Agroforestry

	Traditional	“Modern”
Species/Varietal Diversity	High	Low
Plot size	Small/variable	Large/uniform
Planting format	Random (ecological)	Uniform (rows)
Cultigen arrangement	Integrated/mixed	Segregated
Harvest period	Phased	Uniform
Ecological requirements	Varied	Uniform
Orientation	Subsistence	Market

From: Manner 2005.

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And here is a problem...

To be meaningful, the quantification or measurement of traditional agroforestry systems must utilize methods that are standardized and have wide inter- and intra- cultural/geographic (island) applicability.

Why? Look at the similarities (and differences) between these contrasting systems in Polynesia and Micronesia.... in the next slide.

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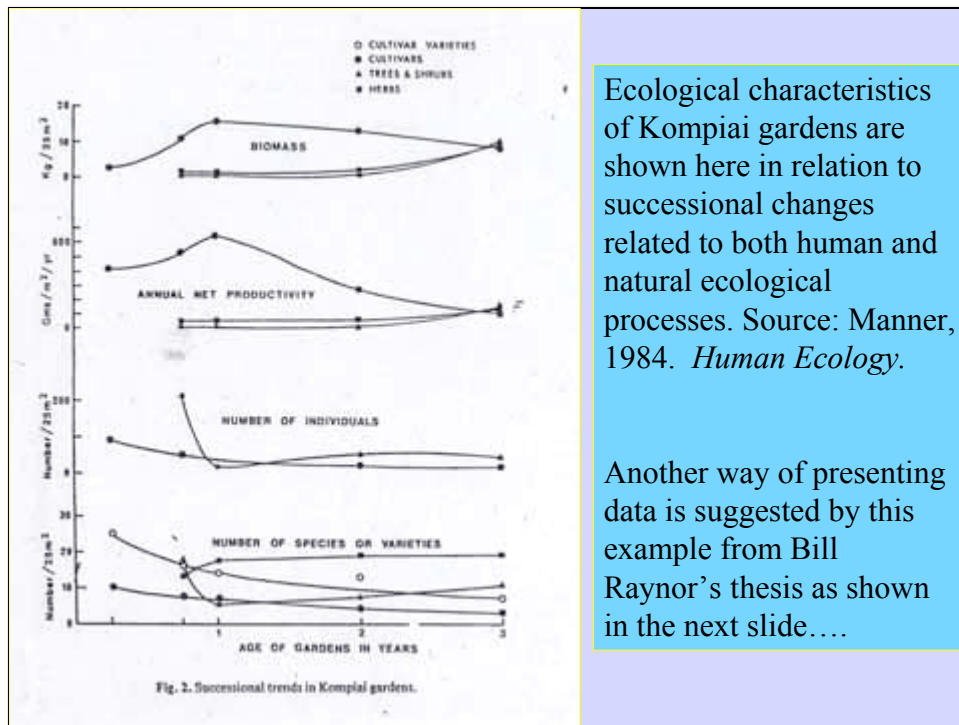
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What kind of data can one collect from traditional agroforestry systems?

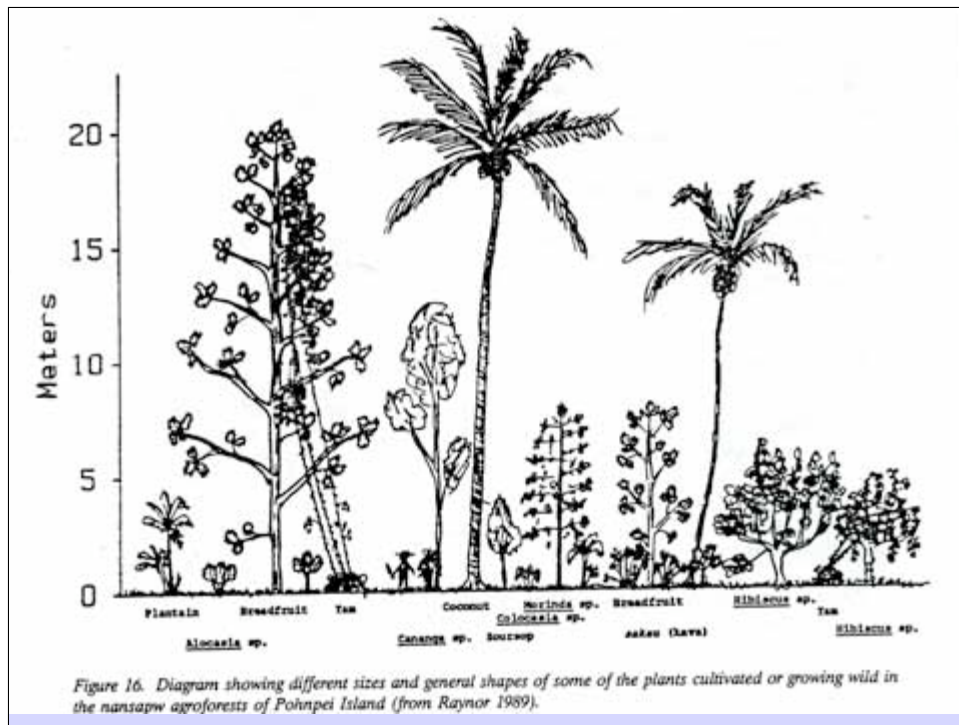
Here is one example of data I collected from Kompiai, WHD, Papua New Guinea in 1967 and 1972....



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Here is a non-exclusive list of ecological characteristics that can be collected/analyzed for traditional agroforestry systems.

1. **Gross production/Community respiration**
2. **Gross production/Standing Crop Biomass**
3. **Biomass/Unit Energy Flow**
4. **Net Community Production**
5. **Total Organic Matter Storage**
6. **Species Diversity - Richness Component**
7. **Species Diversity - Equitability Component**
8. **Vertical Stratification**
9. **Horizontal Stratification**
10. **Size of Organisms**
11. **Life Cycles**
12. **Selection Pressure - Growth Form**
13. **Resistance to Pests and Diseases**
14. **Soil Conservation Capacity**
15. **Length of Cultivation Period**
16. **Cultivar Diversity- Richness Component**
17. **Energetics Ratios - Input to Output**
18. **Major Labor Requirements**
19. **Major Advantages or Benefits of the System**
20. **Major Constraints and Problems**

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In 2005, PABITRA (Pacific Asia Biodiversity Transect Network) published this online manual can be downloaded from the PABITRA website cited below.

<http://www.botany.hawaii.edu/pabitra/biodiversity/default.htm>

Biodiversity Assessment of Tropical Island Ecosystems

PABITRA Manual for Interactive Ecology and Management



Editors

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Curtis Daehler

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I suggest that appropriate methods appropriate for the analysis of traditional agroforestry systems are those which are used in vegetation ecology and presented in the PABITRA Manual.

In the Manual, Table 3 is a summary of the field methods that various researchers have used to analyze the structure and function of traditional agroforestry systems in the Pacific Islands. Quadrats, transects, time and motion studies, photo interpretation, interviews, household accounting of consumption are among the methods that have been used.

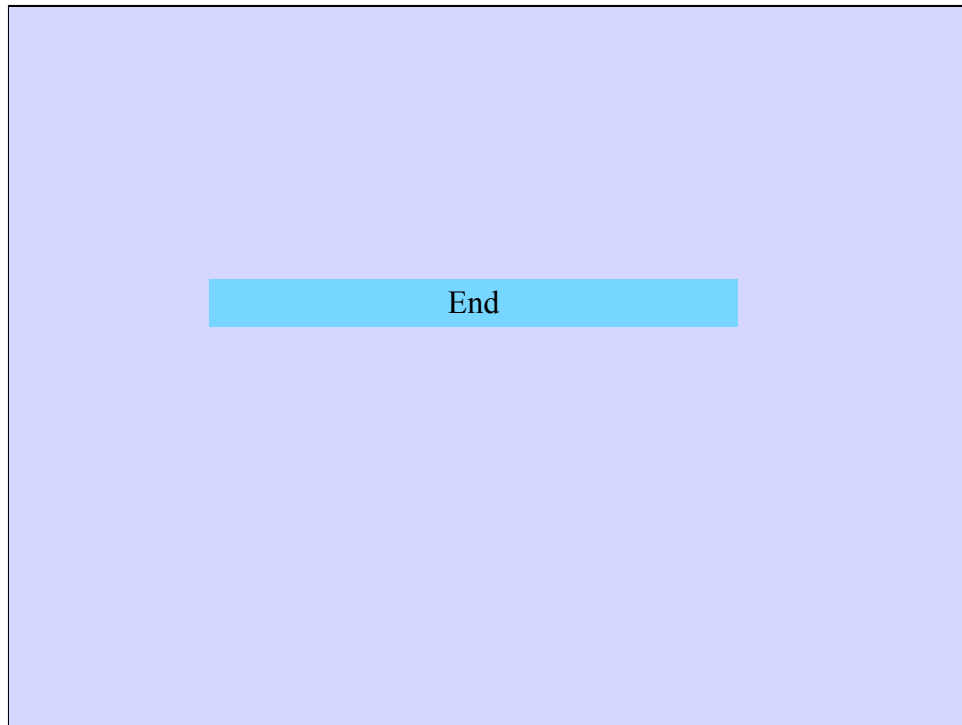
No matter which traditional system is studied,.....

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..... all methods of analysis involve.....counting.

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In American Samoa (Tutuila Island), a number taro cultivation systems are used. On steep hillsides, *talo* (*Colocasia esculenta*) is grown in polycultural swiddens (left). It is also cultivated as a monocrop beneath coconut trees as shown in the slide on the right. More dryland cultivation systems are shown in the following slide.