

Traditional Agroforestry Systems of the Pacific Islands

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

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Traditional Agroforestry Systems of the Pacific Islands

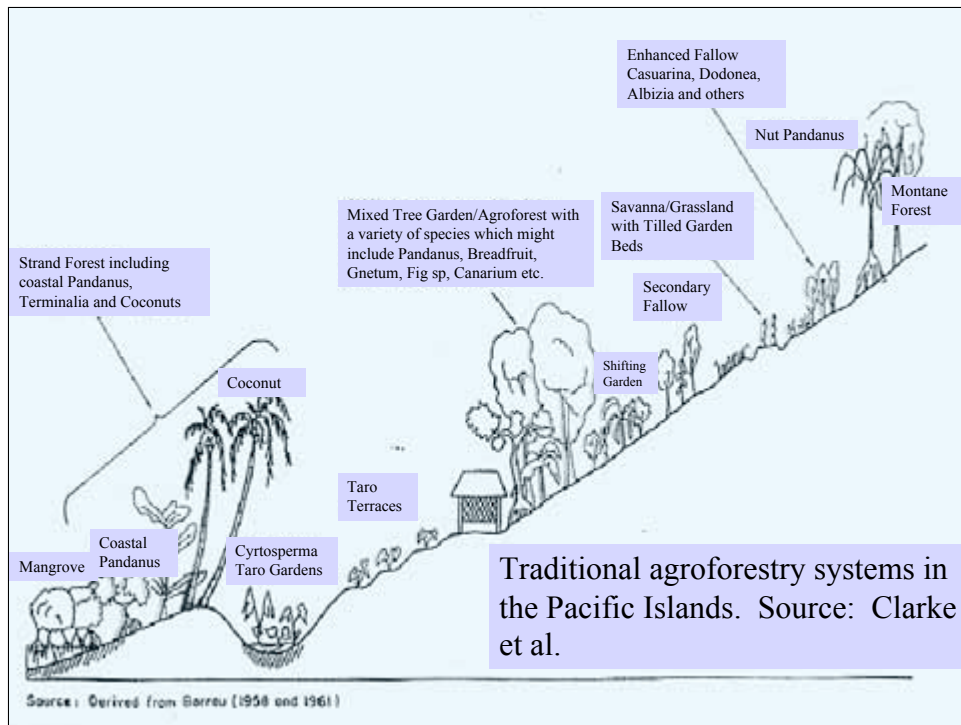
- Introduction
- Definition of Agroforestry
- Classification of Traditional Agroforestry Systems
- Traditional Agroforestry Systems Examples
- Significance and Importance of Traditional Agroforestry Systems: Sustainability, Viability, Biotic and Cultural Diversity
- Conclusion

Agroforestry Defined

... any form of permanent land use which combines the production of agricultural and/or animal products and tree crops and/or forest plants simultaneously or sequentially on the same unit of land, which aims at optimal sustained, multiple purpose production under the beneficial effect of improved edaphic and micro-climate conditions provided by simulated forest conditions, and management practices which are compatible with the cultural practices of the local population (Wiersum 1981, p. 6).

Wiersum, K.F. 1981. Outline of the agroforestry concept. In: Wiersum, K. F. (editor) Viewpoints in Agroforestry, pp. 1-23. Wageningen Agricultural University, Netherlands.

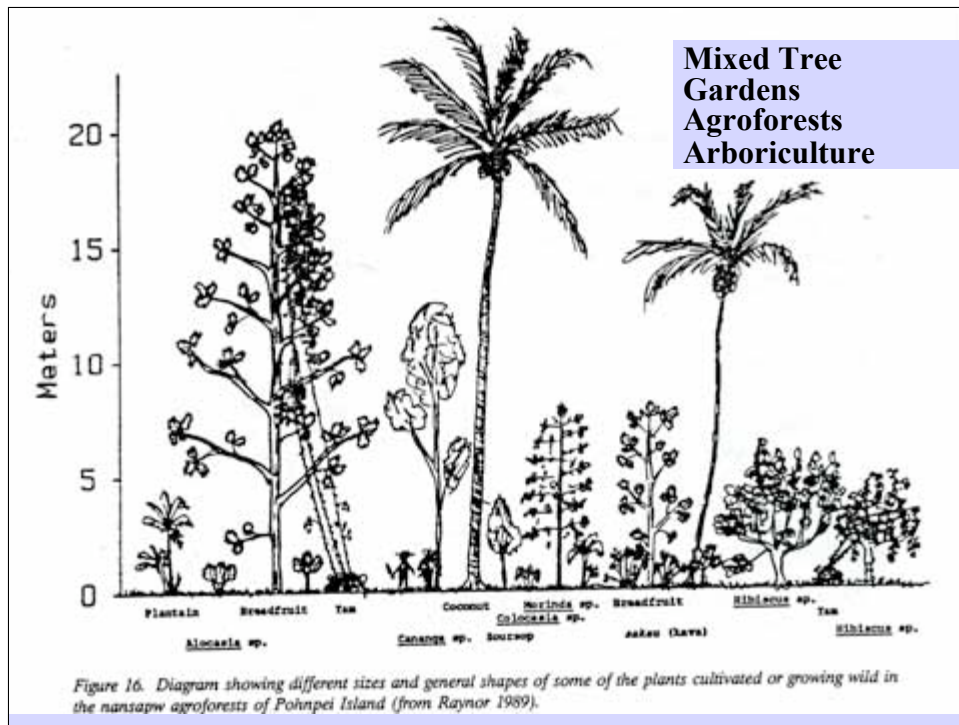
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Classification of Traditional Agroforestry Systems

- Mixed Tree Gardens, Agroforests or Arboriculture
- Intermittent gardens in forest or bush including shifting cultivation
- Intensive Open Field Systems (In fern and grass savannas including drainage ditching)
- Wetland Taro Systems (*Cyrtosperma chamissonis* and *Colocasia esculenta*)
- Backyard or Kitchen Gardens
- Animal Husbandry

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Left: Traditional Pohnpeian agroforestry with yam vines on bamboo leaders. Above: Closeup of yam vines on bamboo leaders.

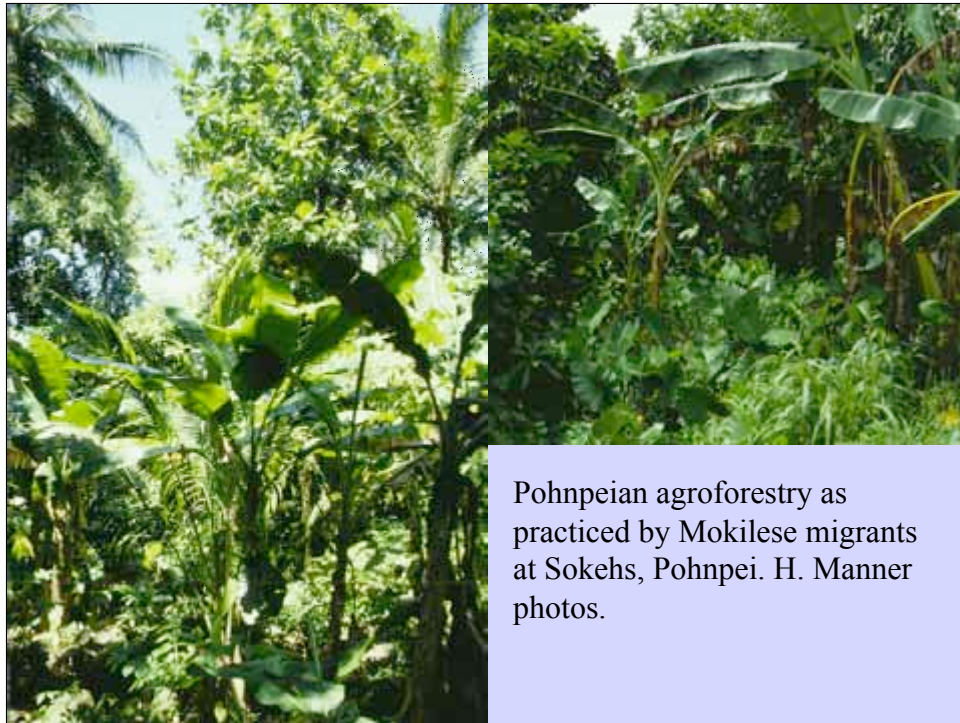
Photos by H. Manner unless otherwise noted.

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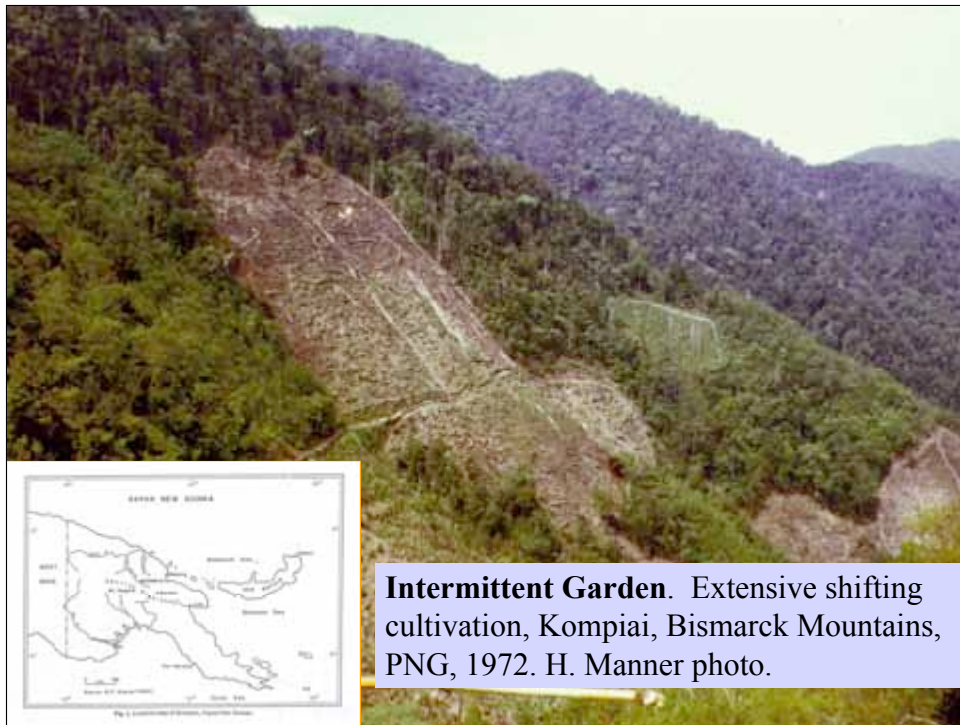
Pohnpeian agroforestry. Left. Yam leaders. Right. Piper methysticum (sakau, kava).

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Pohnpeian agroforestry as
practiced by Mokilese migrants
at Sokehs, Pohnpei. H. Manner
photos.

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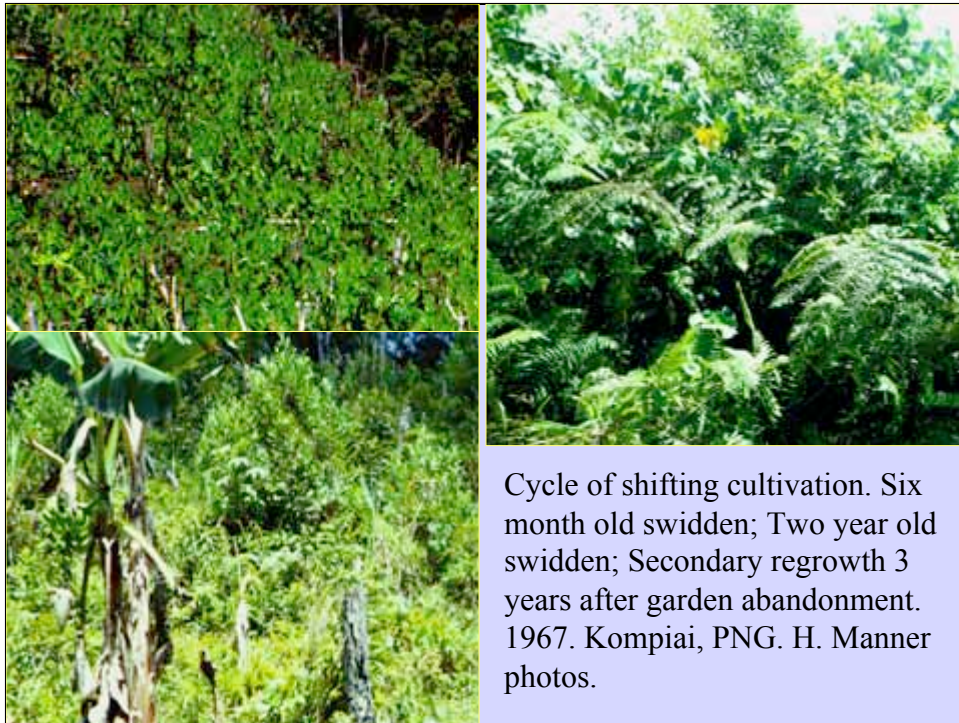


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Cycle of shifting cultivation at Kompiai, Papua New Guinea, July 1967. Cutting, burning, and closeup of a young polycultural swidden H. Manner photo.

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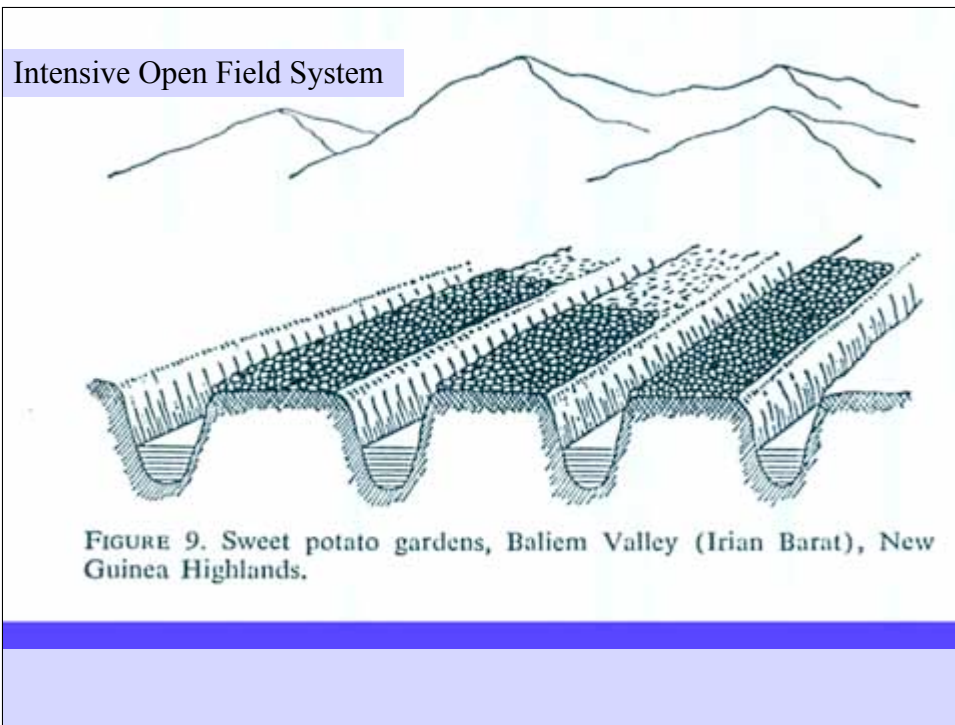
Cycle of shifting cultivation. Six month old swidden; Two year old swidden; Secondary regrowth 3 years after garden abandonment. 1967. Kompiai, PNG. H. Manner photos.

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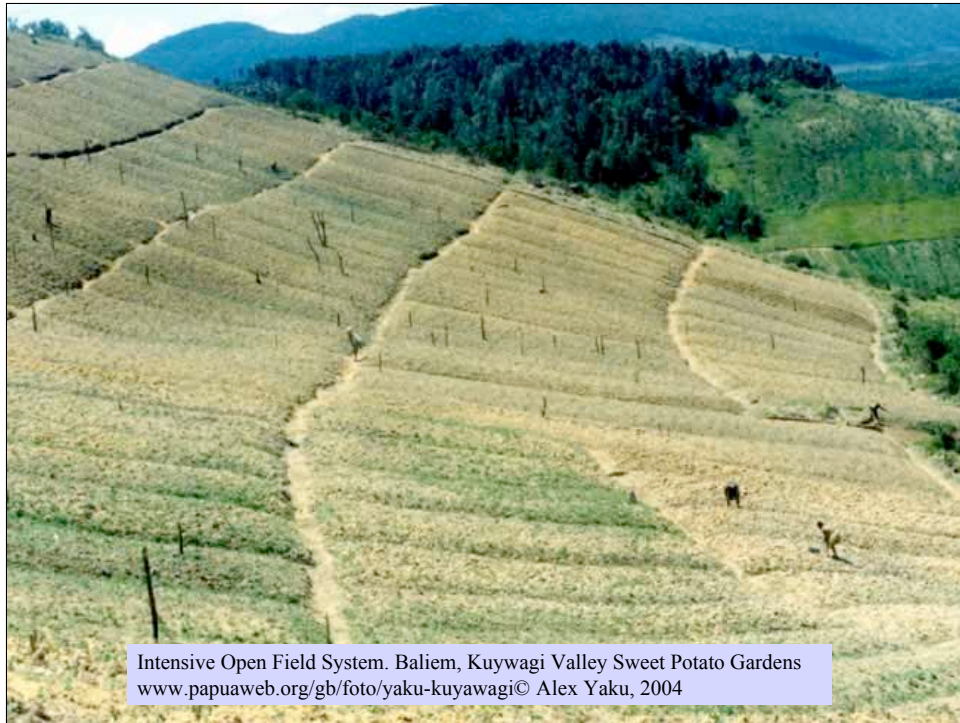


Vegetation change at Kompiai, PNG as a consequence of shifting cultivation and burning. Left. Towards the hamlet of Kupeng (5000' above sea level), most of the slopes are covered with secondary forests, subsistence gardens and grasslands. In the immediate foreground, new gardens are being prepared from secondary forests. In the background, a burned grassland. Right. Anthropogenic grassland at Kompiai, a response to increased population pressure on land, in particular, shortened forest fallow periods and burning. In traditional PNG, agricultural use of grasslands require an increased expenditure of energy in the form of labor and the development of intensive open field systems of cultivation.

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Intensive Open Field System. Baliem, Kuywagi Valley Sweet Potato Gardens
www.papuaweb.org/gb/foto/yaku-kuyawagi © Alex Yaku, 2004

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Wetland Taro Systems. Intensive taro cultivation systems require a heavier application of labor and time relative to output. In the high volcanic islands of Hawaii, *Colocasia* taro was intensively cultivated in the *lo'i* or taro patch. The *lo'i* was created in valley bottoms where streams were diverted to maintain a constant flow of fresh water. Left, *Lo'i* at Keanae, Maui. Right, Harvesting *kalo* at Waipio, Hawaii.

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The atoll islands of the Pacific are difficult ecosystems to cultivate. Despite poor and infertile soils, shallow and often brackish ground water lenses and salt spray, atoll islanders have developed a number of sustainable agroforestry systems. Puluwat Atoll, Chuuk State, FSM.

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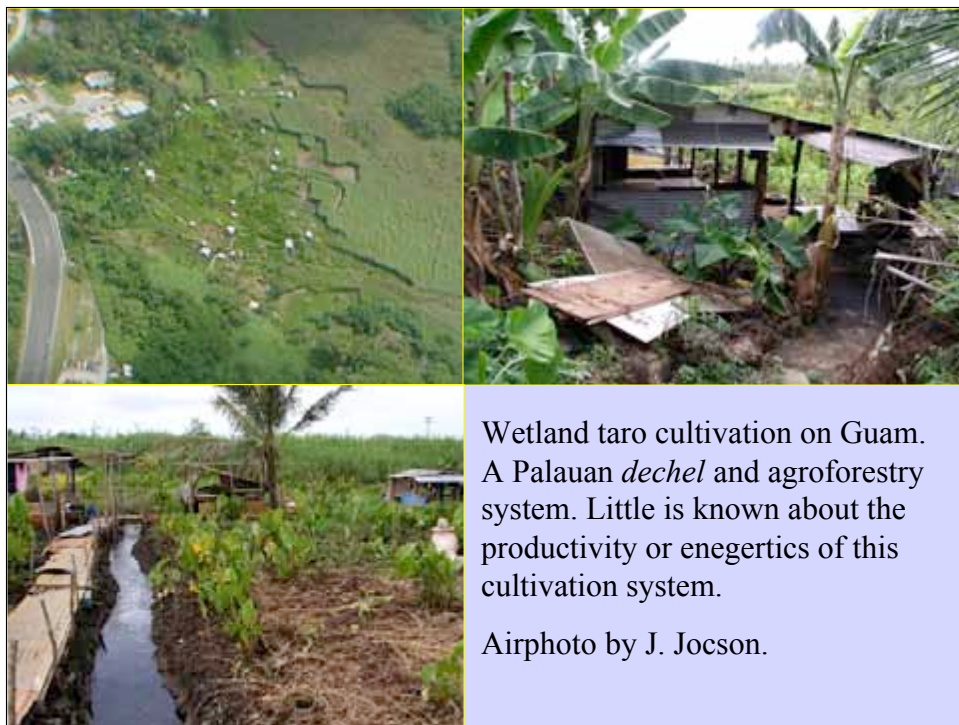


Giant swamp taro cultivation, Kiribati. Slide courtesy of SPREP.

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Wetland taro cultivation on Guam. A Palauan *dechel* and agroforestry system. Little is known about the productivity or energetics of this cultivation system.

Airphoto by J. Jocson.

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Backyard agroforestry

Top Left: Yams in a backyard garden at Pago Bay, Guam.

Top Right: Mokilese garden at Sokhes, Pohnpei.

Left: Taro and betel nut, roadside at Colonia, Yap.

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Significance of Traditional Agroforestry Systems:
A Reservoir of Biotic and Cultural Diversity

Table 2. Puluwat Cultivar Composition. A Comparison of Data From Elbert (1972) and Manner & Mallon (1989).

Species	No. reported by Elbert 1972	No. lost since 1972	No. varieties common to both surveys	No. varieties introduced since 1972	No. present on Puluwat 1989	Total No. of cultivars
<i>Artocarpus altilis</i>	35	11	24	5	29	40
<i>Artocarpus mariannensis</i>	7	0	7	0	7	7
<i>Cocos nucifera</i>	11	2	9	0	9	11
<i>Colocasia esculenta</i>	33	17	16	15	29	46
<i>Cyrtosperma chamissonis</i>	33	20	13	11	24	44
<i>Musa x sapientum</i>	30	11	19	4	23	34

Source: Manner & Mallon (1989).

Conclusion

In this presentation, a range of traditional agroforestry systems have been shown. These systems are largely sustainable and viable as they are mainly dependent on natural ecological processes and human energy and innovation. The range of traditional agroforestry systems suggest strongly an evolutionary (technological) development associated with population pressure on Pacific Island ecosystems.

In a rapidly modernizing world, traditional agroforestry (and agriculture) are highly important in maintaining the biotic and cultural diversity of the Pacific Islands. This is as good a reason as any for their continuance.

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Major background papers for this presentation are:

Manner, H. I. 1990. A Review of Traditional Agroforestry in Micronesia. In, Raynor, B. and Bay, R. R., (Tech. Coordinators), *Proceedings of the Workshop on Research Methodologies and Applications for Pacific Island Agroforestry*, pp. 32-36. USDA Forest Service Pacific Southwest Research Station General Technical Report PSW-GTR-140. July 16-20, 1990, Kolonia, Pohnpei, Federated States of Micronesia.

Manner, H. I. 2005. Traditional Agroecosystems. Chapter 6. In, Mueller-Dombois, D., Bridges, K. W., and Daehler, C. (Eds.), *Biodiversity Assessment of Tropical Island Ecosystems. PABITRA Manual for Interactive Ecology and Management*, pp. 89-104. URL: <http://www.botany.hawaii.edu/pabitra/>

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Cyrtosperma chamissonis (giant swamp taro), Mokil Atoll, FSM.

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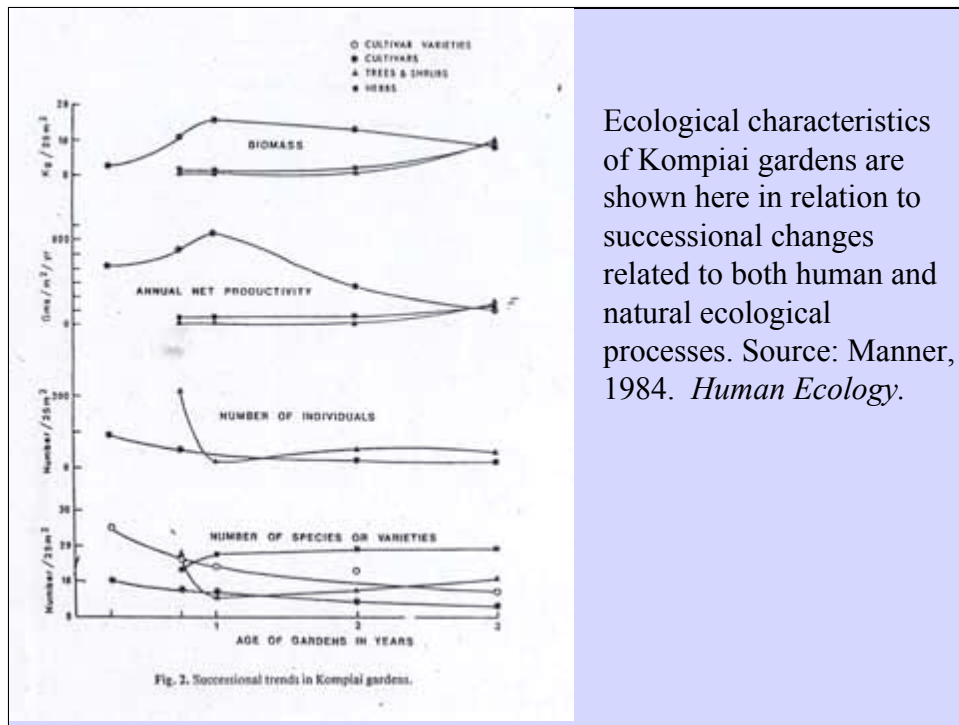
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In Micronesian atolls, taro is usually grown in excavated depressions near the center of the motu (islet) where the freshwater lens is thickest and the problem of salt water is less. Top left: *Cyrtosperma chamissonis* taro in a depression in the forest on Mokil Atoll.

Bottom left: Mokilese backyard garden at Sokehs on Pohnpei Island containing bananas, *Colocasia* and *Cyrtosperma* taro. Mokilese migrants to Pohnpei have adapted their traditional agriculture to the volcanic island environment of Pohnpei, FSM.

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Ecological characteristics of Kompiai gardens are shown here in relation to successional changes related to both human and natural ecological processes. Source: Manner, 1984. *Human Ecology*.