# Why Australia Remained a "Continent of Hunter-Gatherers"

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# Why Australia remained a "continent of hunter-gatherers"[1]

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*Abstract.* Why was farming not practiced in Australia prior to European contact? It has been proposed that the geography of the continent precluded the kinds of food production that were practiced in nearby Melanesia. But much of Australia is well suited for the cultivation of the crops that were farmed elsewhere in the region, wild species of plants endemic to Australia were farmed elsewhere, many farmed species were extraordinarily footloose spreading throughout the region but bypassing Australia, and Australians had substantial contact with farmers from New Guinea where farming had been introduced at a time when the two land masses were connected by a land bridge. An alternative conjecture is that it was the absence of suitable institutions – and private property especially – that accounts for Australia remaining a "continent of hunter-gatherers."

Keywords: paleobotany, farming, geography, Melanesia, technology, New Guinea.

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While the explanation of Holocene technological and institutional revolution remains controversial, there is broad consensus on the following outline (*1-4*). Under favorable Holocene weather conditions, cultivation and eventually domestication spread as farmers displaced foragers and foragers converting to farming for their livelihood (*1*, *2*). But in many parts of the world the hunter-gatherer economy persisted, even under farming-favorable climatic conditions and among foragers in close contact with farmers or living in areas ideally suited for farming.

Captain James Cook (*5*) sailing near Cape York, Australia in 1770 remarked: "In this Extensive Country it can never be doubted that most sorts of Grain, Fruits, Roots &c of every kind would flourish were they once brought hither… When one considers the Proximity of the Country with New-Guiney, New Britain and several other islands which produce Cocoa-Nutts and many other fruits proper for the Support of Man it seems strange that they should not long ago have been transplanted here" Another sea captain, John Moresby a century later, shared Cook's puzzlement "that these people [the Aboriginal Australians of Cape York] have never learnt to cultivate the earth…whilst their Papuan neighbors in the near Torres Strait islands … supply themselves with constant vegetable goods." (*6*)

They were right to be puzzled. Figure 1 shows some of these areas in Australia, which remained the "continent of hunter-gatherers" until farming was introduced by the English late in the 18$^{th}$ century (*7*).

Diamond noted the same puzzle but found the resolution in Australia's unsuitability for farming. "the persistence of Stone Age nomadic hunter gatherers in Australia, trading with Stone Age New Guinea farmers and Iron Age Indonesian farmers ... reflect[s] the ubiquitous role of geography in the transmission of human culture and technology." (*8*):317 But this view seems to be incorrect, in light of the following.

*Parallel species farmed in New Guinea and occurring wild in Australia.* Many of the species that were cultivated and eventually domesticated in New Guinea and throughout Melanesia – including key crops such as taro, yam, and sweet potato – also grew wild and were gathered and used but never farmed by Aboriginal Australians (*9*):832. D.E. Yen documents at least eleven such species and refers to "…the parallel species of cultivated New Guinea cultigens and species gathered in Aboriginal foraging systems." (*9*):832. In three cases the Australian species that grow wild in Queensland, Western Australia and the Northern Territory were identical to the cultivated New Guinea taxa: *Colocasia* esculenta (taro), *Dioscorea* (yam) alata & bulbifera. ((*9*) Figure 1, p. 832). Three very close wild variants of the sweet potato *Ipomoea* are also found in these Australian regions. Wild relatives of rice (*Orza* spp) occur widely in the extensive swampy areas of New Guinea and northern Australia. (*9*):(832) Moreover, Yen reports

that: “Of the six most important domesticate tree genera of New Guinea and the Melanesian islands, four [nut bearing trees] are represented in the tropical north of Australia, particularly in the Cape York region.” Some of these were gathered, but none were farmed by Aboriginal Australians.

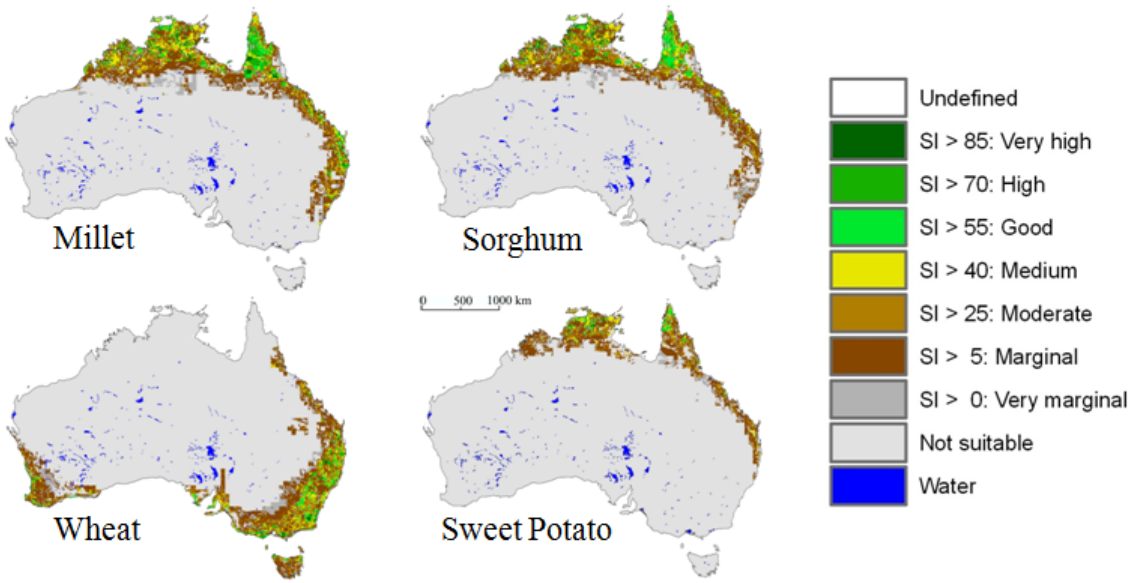


**Figure 1. Areas Suitable for Rain Fed Cultivation in Australia**

SOURCE. – Fischer et al. (2002). Food and Agriculture Organization's Global Agro-Ecological Zones (GAEZ) 2002 database available from http://www.iiasa.ac.at/Research/LUC/SAEZ.
NOTE. – The locations of the greatest concentration of hunter-gatherers prior to European contact include substantial areas of rich farmland, including what is now termed the wheat belt and the northern and eastern coastal regions suitable for yam and sweet potato (that latter of which came much later).

*Farming suitable areas in Australia.* Large areas of Australia populated in the past by hunter-gatherers were suitable for growing the staple crops of the Melanesian farming system: taro, yam, and sweet potato (see Figure1, from (*10*)). The taro-yam suitable areas include all of the tropical and sub tropical areas shown in Figure 1 but do not extend quite as far south as the sweet potato. Some of the best conditions in the world (according to the FAO) for growing sweet potatoes (rain-fed) are the green patches in Figure 1 on the Australian and New Guinea sides of the Torres Strait (*11*) and the sweet potato suitable conditions extend over much of the areas of the Northern Territories and Queensland populated by hunter-gatherers in the past. Taro and yams are somewhat less tolerant of cold temperature and can be grown along the sub tropical north coast of Queensland, Australia (*12*) and taro even as far south as Sydney (NSW).

*Footloose crops.* These and other Melanesian crops traveled long distances around Melanesia, the Pacific and the Indian Ocean – from Hawaii in the east to Africa in the west – and

easily could have diffused to Australia (*12, 13*)). Most of the crops farmed on at any particular place in Melanesia were imported by migrants rather than independently originating from locally endemic species. Farmed crops could easily have moved from New Guinea to Australia. Among the earliest farmers were the New Guineans who began the practice by at least 6950-6440 cal BP and quite likely much earlier (*14*). Among the earliest farmed crops in New Guinea were bananas; these were also cultivated throughout Melanesia from 3500 BP and spread as far as Hawaii in the east and Africa in the west (*13*). Bananas are now successfully grown in Northern Queensland. Like bananas, cultivated taro and yam spread extraordinarily widely from their Melanesian origins across long ocean distances. The sweet potato also was grown in Polynesia and New Zealand a thousand years ago and it was widely farmed subsequently in Melanesia, including New Guinea prior to the English settlement of Australia

*Extensive contact*. This is especially the case in light of the two facts: First, New Guinea and Australia were part of the same land mass connected by a broad plain until 6 thousand BP which is after (and probably long after) when New Guineans started farming plain. Even today one can cross the Torres Straits by a series of island hops the longest of which is 40 km. The islands have been inhabited for at least the last 2500 years, and the largest, Muralug just 16 km from Australia was occupied by New Guineans who farmed taro, yam, and banana. Second, Aboriginal Australians had sustained contact with their farming neighbors to the north (not only New Guinea and other parts of Melanesia, but Indonesia as well) both before and after the rise in sea levels.

If domesticated plants from Melanesia diffused far to the North, East and West and affected agricultural practices in many parts of South East Asia, the Pacific, and even Africa, the same must have been technically feasible to nearby Australia immediately to the South. Moreover, Australians could have cultivated indigenous species; and had they done so the result might well have been another familiar example of first farmers. Yen concludes (*9*)

> Had Australian Aborigines invented agriculture independently, the major genetic elements in the systems of the tropical north and its easterly and westerly sub-tropical coastal extensions might have resembled the taro-yam complex of northern Sahul [New Guinea]. (*9*):844

> In central and southern regions of Australia there could have been classical domestication sequences of root crops followed by seeds. In over a century of historical observation, ethnography, and archaeology, however, there has been no indication of agriculture in the diverse Australian landscapes … [D]omestication of plant species through control of breeding systems and adaptation through modification of the environment …are missing in Australia. (*9*):844

The fact that despite existence in Australia of wild species that elsewhere were cultivated, the suitability of parts of Australia for cultivation, the impressive geographical mobility of the main cultivars of the Melanesian farming systems (and other species) and the ease of contact between Melanesian and Australian peoples, farming nonetheless did not occur in Australia is consistent with the hypothesis that the lack of appropriate property rights was an impediment. Many of the crops that were farmed throughout Melanesia and technically could have been farmed in Australia involved labor-intensive mounded cultivation (*14*) or long term care of trees (which even had the status of clan money in some places (*12*)).

These crops would not have been undertaken in the absence of private property rights providing a reasonable guarantee that the returns to these long term investments would be enjoyed by the individual or family undertaking them.Jung-Kyoo Choi and I conjecture that it was the absence of farming suitable institutions, not geography that explains why Australians did not farm prior to European contact (*10*).

*Sources and methods for Figure 1.* For Figure 1 Choi and I used the Food and Agriculture Organization's Global Agro-Ecological Zones (GAEZ) 2002 data base available from http://www.iiasa.ac.at/Research/ LUC/SAEZ/ index.html. The database contains some 2.2 million grid-cells (at 5' latitude/longitude), covering all countries' land resources. A grid-cell amounts to a land area of some 5,000 to 10,000 ha, depending on the latitude of a location. The database reports the current suitability for the cultivation of 28 crops based on the match between crop characteristics, rainfall, growing season and other aspects of climate, soil conditions, and terrain. The FAO ranks its suitability indices into several categories from "very high" to "marginal," "very marginal" and "not suitable". From the data base we extract the crop suitability index for sweet potatoes for the regions of Australia. The above website has further information to calculate the suitability index.

Works cited


1. G. Barker, *The agricultural revolution in prehistory: why did foragers become farmers?* , (Oxford University Press, Oxford, 2006), pp. 616.

2. P. Bellwood, *First Farmers: The Origins of Agricultural Societies*. (Blackwell, Oxford, 2005), pp. 384.

3. T. D. Price, Ed., *Europe's First Farmers*, (Cambridge University Press, New York, 2000), pp. 395.

4. M. Zvelebil, *Hunters in Transition: Mesolithic Societies of Temperate Eurasia and Their Transition to Farming*. (Cambridge University Press, Cambridge, 1986).

5. J. Cook, *The explorations of Captain James Cook in the Pacific*. (Dover, Mincola, 1971).

6. D. Harris, Early agriculture in New Guinea and the Torres Strait divide. *Antiquity* **69**, 848 (1995).

7. H. Lourandos, *Continent of Hunter-gatherers*. (Cambrdige University Press, Cambridge, 1997), pp. 390.

8. J. Diamond, *Guns, Germs, and Steel*. (W.W. Norton & Co, New York, 1997), pp. 480.

9. D. E. Yen, The development of Sahul agriculture with Australia as bystander. *Antiquity* **69**, 831 (1995).

10. S. Bowles, J.-K. Choi, The Neolithic agricultural revolution. *unpublished manuscript*, (2015).

11. G. Fischer, H. van Velthuizen, M. Shah, F. Machtergaele, "Global Agro-ecological Assessment for Agriculture in the 21st Century: Methodology and Results" (International Institue for Applied Systems Analysis, Roma, 2002).

12. P. V. Kirch, Second Millennium B.C. Arboriculture in Melanesia: Archaeological Evidence from the Mussau Islands. *Economic Botany* **43**, 225 (1989).

13. E. De Langhe, P. de Maret, in *The prehistory of food: Appitites for change*, C. Gosden, J. Hather, Eds. (Routledge, London, 1999), pp. 377-396.

14. T. Denham, S. Haberle, C. Lentfer, New evidence and revised interpretations of early agriculture in Highland New Guinea. *Antiquity* **78**, 839 (2004).