GILBERT ISLANDS LANDSCAPE

Edwin Doran Jr.

The sixteen atolls and islands which comprise the Gilbert Islands are strewn across the equator, not far west of the Date Line, for more than 400 miles from southeast to northwest (Fig. 2). An uneven distribution into such clusters as the Abemama-Kuria-Aranuka group, separated by 40 or 50 nautical miles of open ocean from adjacent atolls, has been of some importance historically and in the development of present land-holding patterns.

The islands are typical atolls, for the most part, with a central lagoon, elongated from southeast to northwest, and a surrounding chaplet of low-lying coral islands barely protruding from the sea (Fig.3). Individual islets are miles long but only furlongs-wide, and a few minutes' walk takes one from the ocean shore, where waves breaking on the fringing reef send up showers of spume, across to the quiet lagoon beach with its gently lapping wavelets. Variations in land surface along the long axis of islets are slight indeed. The most pronounced occur at breaks between islets where tidal channels connect ocean and lagoon or at lower land areas where storm washovers have reduced soil and vegetation to meager quality. By contrast, and in much shorter distance, the changes across widths of islands are marked and significant, in terms of exposure to wind and salt spray, in vegetation, in launching sites for canoes, and many others. The natural environment suggests strongly to man that the advisable manner of dividing up his lands is in cross-island units, and this usually he has done.

In most respects the Gilberts are favored with a pleasant, tropical maritime climate. Temperatures are equable and almost never vary more than ten degrees from an annual mean of about 82 degrees. The hottest

mid-day usually is moderated by strong breezes off the ocean, and winds of typhoon velocity are nearly unknown. By contrast the sparsity and variability of rainfall stand out with especial clarity. The westward extension of the dry equatorial tongue crosses the southern Gilberts, hence annual rainfall in this part of the chain is as low as 41 inches on Tabiteuea. Increases to over 50 inches at Arorae and to well over 100 inches at Butaritari occur transitionally to south and north. Even these figures, however, are insufficient to describe a variable climate in which annual rainfalls fluctuate markedly, as the recorded range from 15 inches to 115 inches at Tarawa examplifies. Since an annual rainfall of about 32 inches divides humid from semi-arid climates under these temperature conditions it is evident that the central Gilberts are not far removed from drought at best and that most of the chain is likely to suffer from time to time.

Under the edaphic and rainfall conditions which prevail vegetation inevitably must be sparse. Coconut trees are the dominant cover and thrive except in drier years, pandanus is hardy and a perennial food source, and babai, the coarse taro-like root, provides starch. An impoverished flora, with such species as Scaevola, Pemphis, and Rhizophora, fulfills most basic needs for fuel and construction materials, although formerly canoe building often had to await discovery of a properly large drift log.

According to recent estimates the population of the Gilbert Islands is approximately 33,000, equivalent to a population density of 288 persons per square mile. Since this is one of the greatest densities in the Pacific and occurs on islands sparse in rainfall and resources it is evident that problems of land tenure here are inevitably considerable.
How close this density approaches the maximum number that could be

supported under an economy of subsistence agriculture and fishing is, of course, a critical question to which no good answer can be given. Although a density of 520 per square mile has been suggested as feasible Maude questions such a concentration. Some insight is provided by the crude population estimate of 40,000 persons able to occupy the Gilberts at the time of the Wilkes Expedition of 1841.

Another approach, based on the idea that rainfall is a limiting factor on food production and hence on population is to compute a Kendall's rank correlation coefficient relating rainfall and population density of the several islands (Table 1). One might suspect that islands with heavier rainfall could support denser populations and that there should be a correlation between the two factors. The coefficient which emerges, 0.457, lies just within the limits of chance occurrence, and the suspected relationship is not firmly established. 1/ From this one could argue that populations as yet have not reached the maximum imposed by available rainfall but may well be approaching this limit.

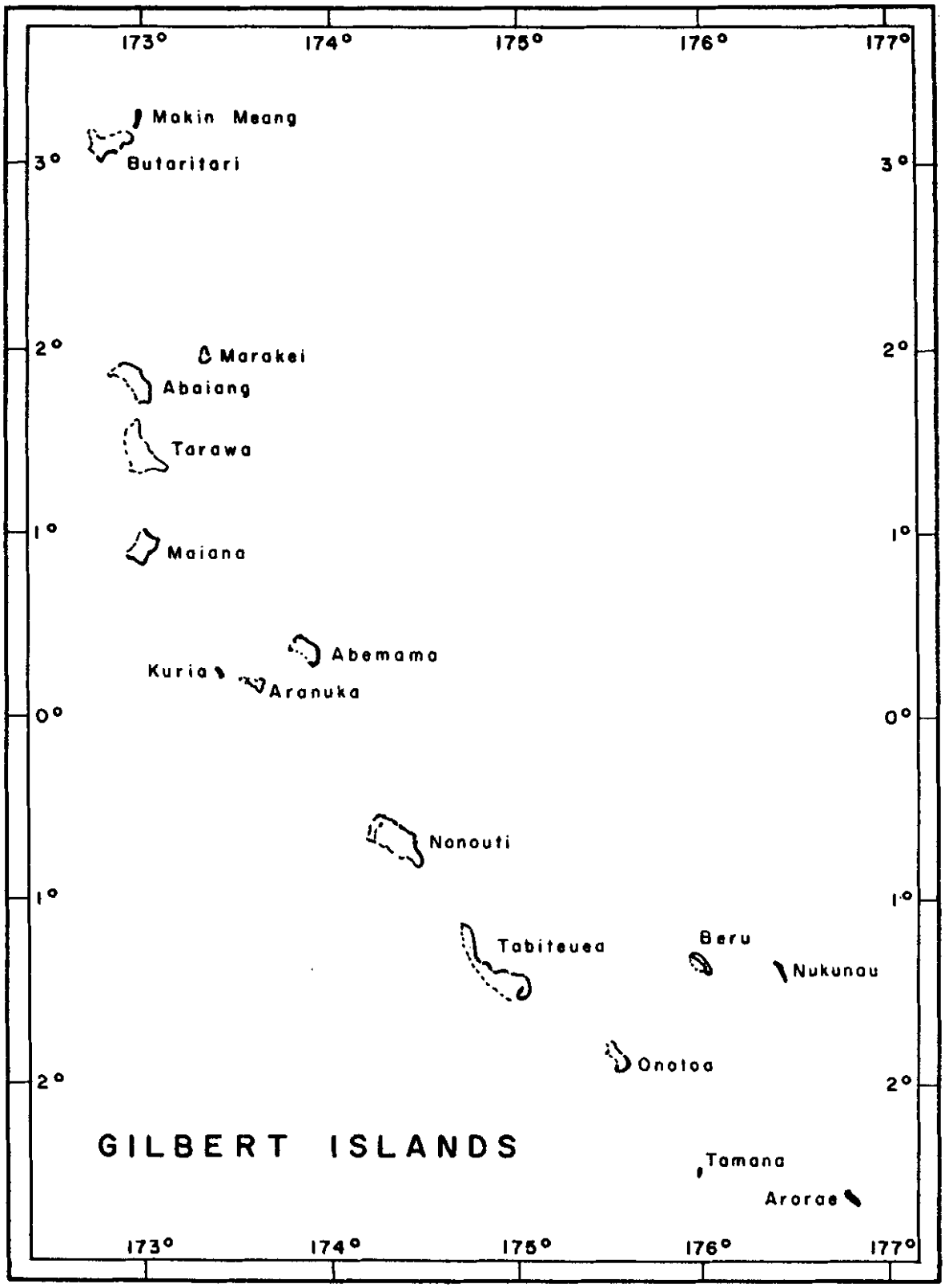
1/ A correlation coefficient larger than 0.475 would be significant at the .05 level.

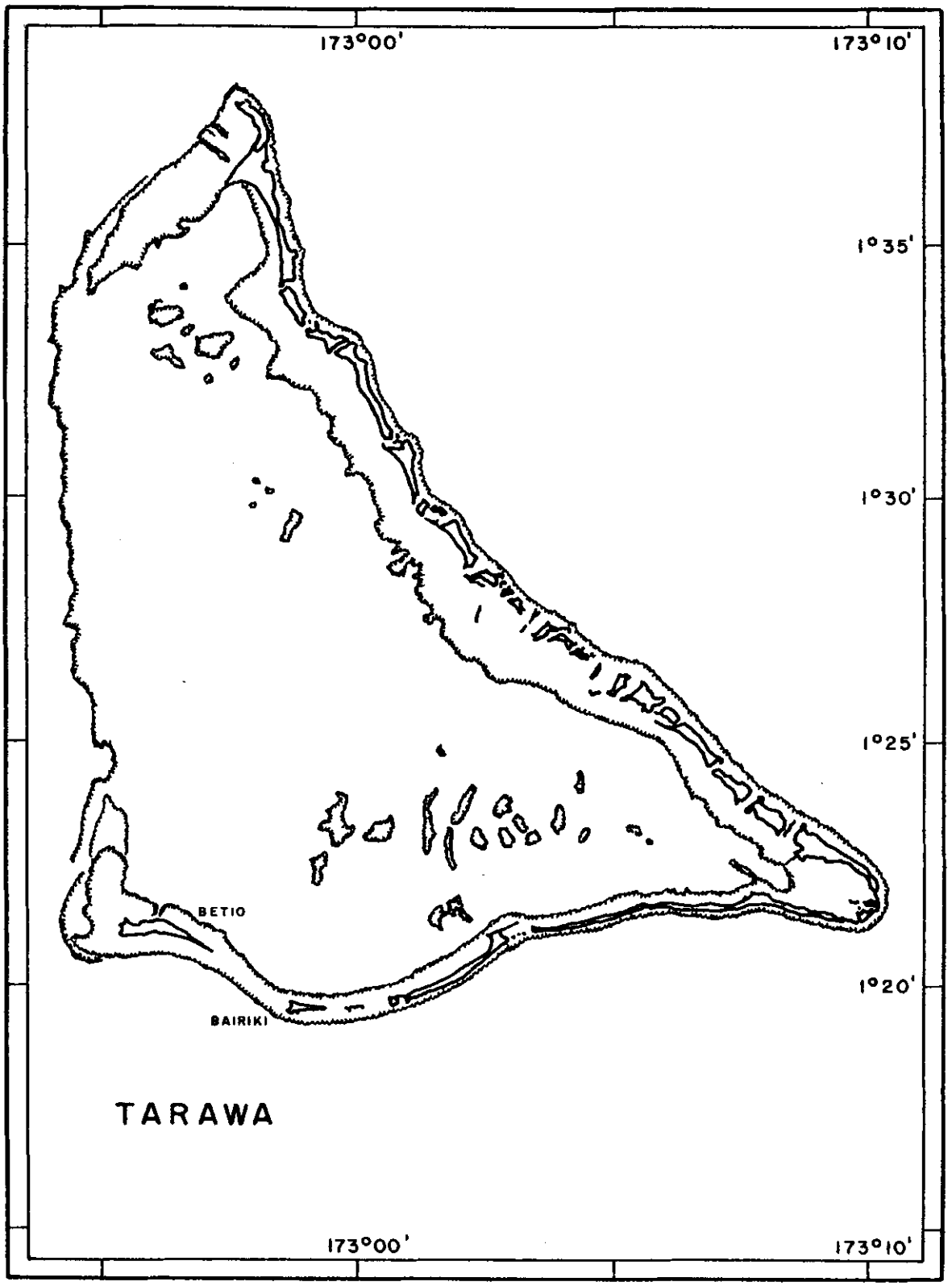
TABLE 1

GILBERT ISLANDS: POPULATION DENSITY-RAINFALL RANK CORRELATION

Island (or atoll)	Popul.	Area	Density	Rank	Rainfall	Rank
Makin	1130	2.8	405	4	100	2
Butaritari	2118	4.5	470	2	122	1
Marakei	1790	3.9	460	3	71	4
Abaiang	3234	11.0	295	7	74	3
Tarawa	7125	7.7	925	Omitted	64	Omitted
Maiana	1359	10.4	130	13	57	5
Abemama	1341	6.6	205	11	53	6
Kuria	541	5.0	108	14	48	10
Aranuka	571	6.0	95	15	49	9
Nonouti	2143	9.8	215	10	43	13
Tabiteuea	3266	19.0	172	12	41	15
Beru	1968	8.1	245	9	45	12
Onotoa	1542	5.2	305	6	46	11
Nikunau	2011	7.0	290	8	42	14
Tamana	1142	2.0	515	1	50	8
Arorae	1551	5.0	310	5	52	7
Total	32832	114.0			957	
Average			288		60	
Cases				15		15

Rank Correlation Coefficient = 0.457


173°
174°
175°
176°
177°
3°
2°
1°
0°
Makin
Meang
Butaritari
Marakei
Abaiang
Tarawa
Maiana
Abemama
Kuria
Aranuka
Nonouti
Tabiteuea
Beru
Nukunau
Onotoa
GILBERT ISLANDS
Tamana
Arorae


173°00'
173°10'
1°35'
1°30'
1°25'
1°20'
BETIO
BAIRIKI
TARAWA
173°00'
173°10'