

MARSHALL ISLANDS LANDSCAPE

Edwin Doran Jr.

The diagonal trend of the Gilberts is extended northwestward by the Marshall Islands (Fig. 4). At first sight, and in essence correctly enough, one would consider the two groups as conforming to much the same pattern. Each has a linear arrangement of tiny atolls sprinkled across vast ocean space, and Majuro Atoll appears rather similar to Tarawa (Fig. 5). In both groups islets of coral debris surround extensive lagoons, vegetation is relatively sparse although varying in profusion with the amount of rainfall, and small area combined with large ocean distances combine to form major difficulties for man's occupation.

A closer examination, however, reveals significant differences in physiognomy between the two groups of islands. If the total land area of inhabited islands (atolls) within each group is divided by the number of such islands it develops that the average Gilbert island(atoll) has an area of 7.1 square statute miles whereas the average Marshall island (atoll) has an area of only 2.65 square miles. On the average, then, each Gilbert island (atoll) is 2.7 times as large as each Marshall island (atoll). If the same procedure is used for the area of lagoons, however, precisely the opposite develops; the average Marshallese lagoon on an inhabited atoll is 181 square miles, the Gilbertese lagoon is 67 square miles, and the relation is again 2.7 but in favor of the Marshallese lagoon (Table 2). Curiously enough an approximately similar ratio obtains for lagoon depth; the average lagoon in the Marshalls is 137 feet deep or 2.4 times as deep as the 57-foot average for the Gilberts. Again the ratio

appears, but in opposite form, in reef width; the 4850-foot Gilbertese reef is on the average 3.2 times as wide as the 1500-foot Marshallese reef. Larger lagoons imply longer reefs, evidently, and the total reef area of the Marshalls is estimated at 312 square miles as compared to a total of 212 square miles in the Gilberts. Greater length more than compensates for lesser width (Table 3).

Turning now to population we note that somewhat more than twice as great a Gilbertese population, as compared to the Marshalls, is concentrated on somewhat less than twice as much land area, producing a density for the former of 288 persons per square mile, for the latter 235 per square mile. The greater population, however, is concentrated on fewer islands so that the average population per island is 2050 versus 620 or 3.3 times as large.

Let us now examine a few of the interrelationships significant to problems of land tenure which emerge from these statistics.

Since the average island (atoll) in the Gilberts is three times as large as in the Marshalls one can deduce, in the absence of accurate measurements, that in general the ground water supply must be better in the former. This follows from the known character of atoll freshwater lenses, which, in size and quality, are a function of individual islet size. The utility of vegetation and land and probably soils as well would appear to be greater in the Gilberts because the peripheral fringe of Scaevola and other salt-tolerant but relatively useless forms is an appreciably smaller proportion of the total vegetated area. And since the population per island (atoll) averages three times that in the Marshalls there would appear to be inherent economies of scale accruing to the Gilberts. Maintenance

TABLE 2

| <u>Island Group</u> | <u>Inhab. Area*</u> | <u>No. Inhab. Islands (atolls)</u> | <u>Ave. Area**</u> | <u>Ratio</u> |
|---------------------|---------------------|------------------------------------|--------------------|--------------|
| Gilbert Is. | 114.0 | 16 | 7.10 | 2.7:1 |
| Marshall Is. | 61.0 | 23 | 2.65 | |

| <u>Island Group</u> | <u>Lagoon Area*</u> | <u>Inhabited Atolls (s.str.)</u> | <u>Ave. Area*</u> | <u>Ratio</u> |
|---------------------|---------------------|----------------------------------|-------------------|--------------|
| Gilbert Is. | 738 | 11 | 67.0 | 1:2.7 |
| Marshall Is. | 3624 | 20 | 181.0 | |

* Area in square statute miles

TABLE 3

| <u>Island Group</u> | <u>Ave. Lagoon Depth, ft.*</u> | <u>Ave. Reef Width, ft.*</u> | <u>Total Reef Area, sq. mi.**</u> |
|---------------------|--------------------------------|------------------------------|-----------------------------------|
| Gilbert Is. | 57 | 4850 | 212 |
| Marshall Is. | 137 | 1500 | 312 |

Inhab. Islands (Atolls)

| <u>Island Group</u> | <u>Population</u> | <u>Number</u> | <u>Area</u> | <u>Popul. per Island (atoll)</u> | <u>Popul. Density</u> |
|---------------------|-------------------|---------------|-------------|----------------------------------|-----------------------|
| Gilbert Is. | 32,832 | 16 | 114.0 | 2050 | 288 |
| Marshall Is. | 14,290 | 23 | 61.0 | 620 | 235 |

* Data from Nugent, L. E. Jr. (1946) Coral Reefs in the Gilbert, Marshall, and Caroline Islands. Bull. Geol. Soc. Amer. 57:735-780. Nugent's data for individual atolls have been averaged.

** Data from Nugent, op.cit. Figures here are summations of his atoll reef lengths multiplied by average reef widths minus atoll land areas. The potential errors in such extrapolations are evident.

of schools, hospitals, and trading centers is more efficient with larger population, collection of the copra harvest for overseas shipment is facilitated, and control over land use should also be more easily accomplished.

In maritime affairs, however, the advantage is reversed. Most Marshallese atolls have large lagoons which are essentially reef-free and accessible from the ocean through deep passes, whereas the coral-choked lagoons and paucity of good harbors in the Gilberts are conspicuous disadvantages. Not only is this the situation today, but it must have been true also during indigenous times when large canoes had much the same requirements as modern trading schooners. The northwesterly orientation of the two groups also was of significance during the days of sailing canoes and still is where sails are used. The Marshalls, north of the equator and with northeasterly winds, are ideally oriented for sailing up or down an island chain, in either case with the wind on the beam in a position not requiring tacking. Good harbors and ease of communications along the two Marshallese chains may well have had much to do with their pre-European centralized chiefdoms. The Gilberts, with dominant southeasterly breezes, provided easy sailing toward the northwest but a wet and unpleasant beat back in the other direction. This may have had something to do with its lack of centralized control except in small contiguous groups. These environmental relations must not be overemphasized, but they certainly have some effect.

Catala's study in the Gilbert Islands has emphasized the importance of reef areas in evaluation of atoll resources. Formerly control over reefs was a chiefly prerogative; with the Western concept of

government ownership of land below the high water line such areas now form unsolved problems of land ownership and are little understood from the viewpoint of quantitative contribution to food supply. All would agree that food collected on the reef is significant in atoll diets; few would suggest that this source is more important than equivalent areas of land. If a unit area of reef provides one-tenth as much food as a similar area on land one might argue that the effective land area has been increased by one-tenth of the total reef area. If we apply this "reef utility factor," as it might be called, to the reef areas of both the Gilberts and Marshalls, multiplying the respective reef areas by it and adding the resultant useful area to the total land area, then population densities for the islands are reduced markedly. The Gilberts drop from 288 per square mile to 243, the Marshalls from 235 down to 156.

This is largely an exercise in speculation, but it emphasizes the necessity for obtaining accurate, quantitative data on the actual utility of reefs in order to properly evaluate atoll population densities. Proper allocation and conservation of reef resources evidently is a significant aspect of land tenure problems on atolls.



