VII. SOILS

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Following Stone (1951, 1953) and Fosberg (1954), the principal soils on Jaluit Atoll fall into five categories: (1) Shioya Series, (2) Arno Atoll Series, (3) Jemo Series, (4) mangrove peat, and (5) stony and very stony complex.

The Shioya soils are gray-brown slightly altered lime-sands with varying amounts of gravel, the A-horizon, colored slightly by humus, varying in thickness, depending on the time elapsed since the last disturbance and type of vegetation. The B-horizon is lacking and the C-horizon is lime sand, not much altered, scarcely distinguishable from beach materials. This soil tends to be peripheral on the islets but may also be found in the interiors.

The Arno Atoll soils have a black or very dark gray A-horizon from 1 to several dm. in thickness. The organic content is high. The B-horizon, again, is lacking, and the C-horizon is similar to that of the Shioya with a gradual transition from the A. This series is found generally in the interiors of islets but may extend almost or quite to the lagoon beach. This soil is unquestionably much older than the Shioya.

The Jemo series (Fosberg 1954) has an A-horizon of pure humus varying in thickness up to a dm. or rarely more. Usually it has a consolidated B-horizon of highly phosphatic material of varying thickness. This lies on a C-horizon similar to that of the two foregoing series. Three areas of this series were found during the present survey, none of them typical. On Lijeron Islet under the Pisonia trees the A-horizon is well developed but somewhat mixed with lime-sand. The B-horizon is only slightly and very locally developed. On Imroj Islet the A-horizon is lacking and the B is eroded and cracked into a boulder-field (Pl. VIII-d). It is on the extreme northwest end of the islet, just south of a small mangrove depression. On Kinajon Islet the A-horizon is lacking in parts, present but rather thin elsewhere. Here the Jemo series occupies slightly high ground inside a roughly crescent-shaped group of mangrove depressions near the outer part of the islet. These soils are of great importance because of their phosphatic B-horizons.

The mangrove peats are soft to firm, red to black, purely organic accumulations found especially around mangrove depressions.

The stony and very stony complex is the undifferentiated gravel of varied sizes found especially in peripheral ridges (often termed boulder ridges or boulder ramparts), sometimes in wider areas. It may be very loose and porous, or may contain fine material, often highly organic, between the stones.

Time was not available for mapping these types, nor for mapping the areas of them that were either buried or stripped away by the typhoon. This damage was not very significant on those islets or parts of islets which were not swept over by waves, especially the islets on the south

and west reefs, and presumably in the extreme north of the atoll. On the east reef islets, judging from work on the ground on four islets and aerial inspection of the rest, considerable areas of stony and very stony complex were stripped off, usually exposing either more of the same or beds of poorly consolidated conglomerate (Pls. II-a, V-b). Stripping was rather general along the seaward sides of most of the islets. This rocky material, probably including some freshly thrown up from outside the reef, was mostly spread inland, covering an estimated third or fourth of the total land area of these islets with a gravel sheet that will have to be classified with the stony and very stony complex (Pls. III, VII-b, IX-d, X-b). The buried soils here, at least where examined, were largely Arno Atoll, some Shioya. Lagoonward from the usually abrupt edges of this gravel sheet (Pl. III-a,-b) the Arno Atoll and Shioya soils are in places covered by a few cm. of lime-sand. On these same islets small areas, totaling a considerable amount, were scoured by the waves, removing the A- and often part of the C-horizon.

It is hard to estimate the agricultural significance of this destruction of soils. Unquestionably, where the surface soils have been removed there is a great decrease in fertility. To replace the humus lost from both the Arno Atoll and stony and very stony areas would require fallowing under vegetation for a long time. Even to bring about the slight humus accumulation characteristic of the Shioya soils will require a considerable fallow period. Analyses of similar soils from other atolls show that a large part of the mineral nutrients is concentrated in the more highly organic layers. Cessation of the common Marshallese practice of burning trash and brush would greatly hasten the needed humus accumulation.

The areas stripped down to consolidated material will certainly not be of any immediate agricultural use. Any vegetation that can be encouraged to grow on these areas will be of benefit, both in helping to disintegrate the rock and in accumulating wind-blown material and humus.

The areas covered by fresh gravel sheets would not seem to be very promising for any sort of agriculture. However, if the practice of planting coconuts in 3' x 3' x 3' pits is followed it is probable that in many places these pits may extend down through the gravel layer into the buried Arno Atoll or Shioya soils. The overlying material would then be of no consequence except to make digging more laborious.

The mangrove peat was not noticeably influenced by the typhoon except that in several places small areas were covered by deposits of wave-carried gravel (Pl. III-c,-d). Usually great quantities of vegetable trash were dumped into the mangrove depressions by the waves (Pl. V-c). This will, of course, eventually add to the peat.

An interesting feature was the buried A-horizon, at somewhat less than 1 m. depth, encountered in a well dug under Dr. McKee's direction near the center of the northwest end of Mejatto Islet. This apparently indicates the burial, at some earlier time, of an Arno Atoll soil, perhaps by a typhoon. The overlying material is a gravel similar to that of the gravel sheets laid down by the waves of Typhoon OPHELIA.

Another item of interest is the abundance of pumice fragments scattered inland wherever the land was inundated. Some of these were undoubtedly washed out of preexisting gravel ridges and soil layers, but much of the pumice probably came from the beaches, where much has accumulated, floated from across the sea, especially after the eruption in 1952 of San Benedicto Volcano, off the Mexican Coast (Richards 1958). That this pumice contributes to the fertility of the soil is indicated by the proliferation of roots tightly surrounding particles of pumice buried in atoll soils, observed both on this survey and in the northern Marshalls. Pounded pumice is used to fertilize gardens and taro pits in various atoll groups.

The Germans and Japanese had brought large quantities of volcanic soil from Ponape and spread it over certain areas on Jabor. One of these patches has now settled so that it is covered by salt water at the highest tides. Although all of the imported soil was inundated by sea water during the typhoon, it seems mostly still there and is now supporting a rank growth of weeds.

The overall consequences of the typhoon are unquestionably a loss in productive soils. However, this may be mitigated to some extent if the trash (Pl. VI-d) strewn over the islets by the typhoon and that accumulated under normal circumstances are allowed to rot, rather than being burned as has already started in several places.