

10. ECOLOGY OF MARIE-LOUISE, AMIRANTES ISLANDS

by J. R. Wilson

Introduction

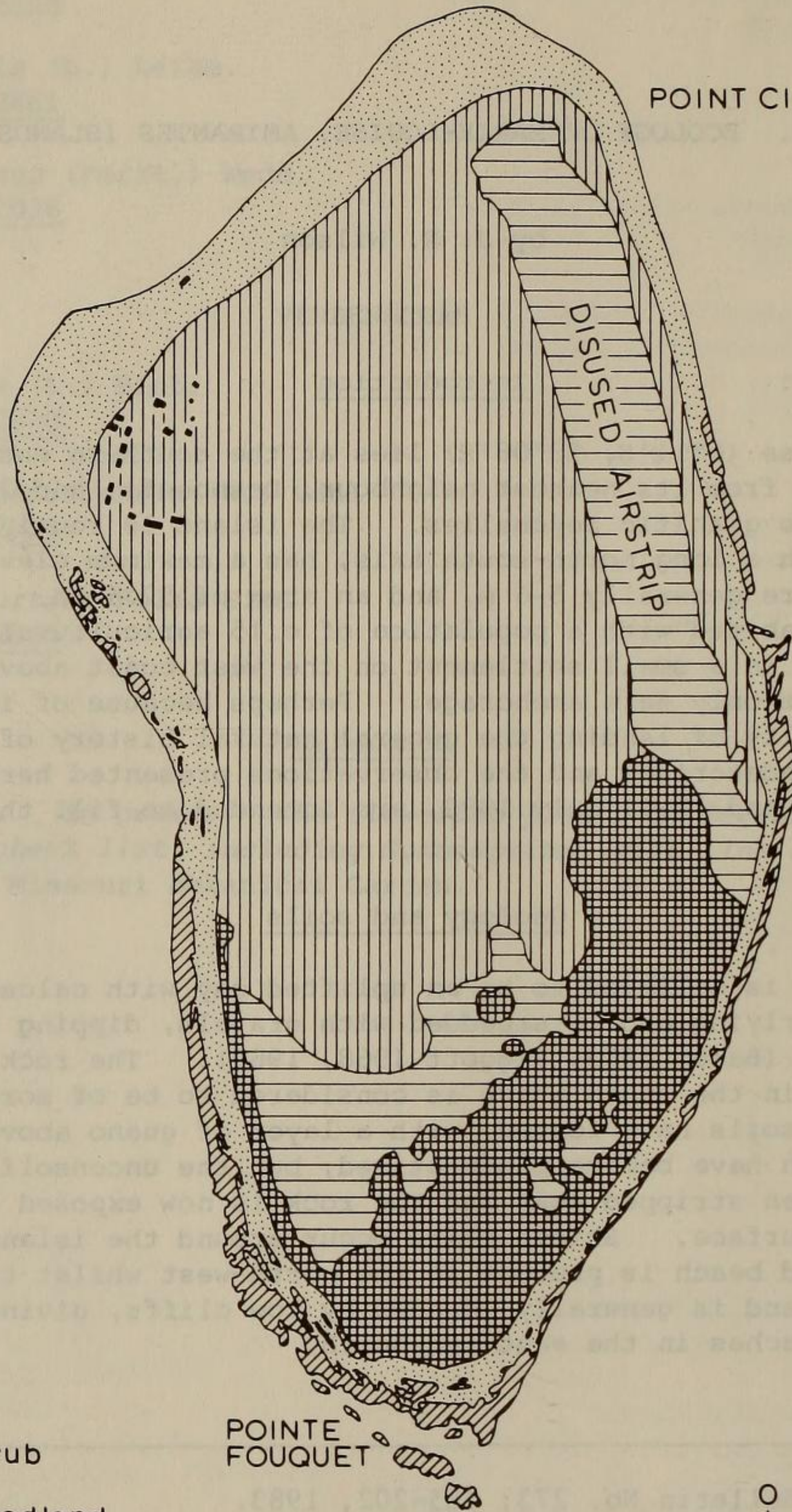
Marie-Louise (6°11'S, 53°08'E) lies at the southern end of the Amirantes 13 km from its nearest neighbour, Desnoeufs, and 280 km southwest of the granitic Seychelles. The island is roughly oval (Figure 11) with a long north-south axis, has a maximum elevation of 9 m although more generally 5-6 m, and an area of 52.6 ha. It is permanently inhabited with a population of c.15 agricultural workers and fishermen based in a small settlement on the west coast above the beach and opposite the only safe anchorage. Perhaps because of its isolation and the difficulty of landing the general natural history of Marie-Louise remains undescribed and the observations presented here, made on 14-15 June 1979 and 10-11 July 1980, are intended to fill this gap.





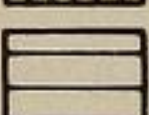
Geology and soils

The island is believed to be an uplifted cay with calcareous sandstones, overlying and interbedded with gravels, dipping outwards from the centre (Baker 1963, Piggott 1968, 1969). The rock is less well developed in the south which is considered to be of more recent origin. Jemo soils have formed, with a layer of guano above the sandstones which have become phosphatised, but the unconsolidated material has been stripped away and the rock is now exposed over ca 75% of the island surface. Shioya soils occur around the island perimeter. A broad beach is present in the north-west whilst the southern part of the island is generally bounded by low cliffs, giving way to rubbly storm beaches in the east and north.

53°08'30"E

POINT CIMETIÈRE



-  Sand
-  Beachrock
-  Littoral scrub
-  Coconut woodland
-  Herbaceous mat

6°11' N

0 m 200

Figure 11. Marie-Louise

Vegetation

Five major vegetation types can be distinguished on the basis of subjective assessment of structure and species content.

Coconut grove community

Cocos nucifera has been planted over the greater part of the island into pits dug through the underlying phosphatic sandstone. Scattered *Hernandia sonora* trees are common throughout the grove which forms a closed canopy at about 12 m. *Morinda citrifolia* and *Carica papaya* are generally abundant in the understory and *Ricinus communis* is locally common. There is a dense and varied ground flora in which *Tridax procumbens*, *Boerhavia* sp., *Stachytarpheta jamaicensis* and *Passiflora suberosa* are widespread and conspicuous. Towards the airstrip trace in the north and the *Scaevola* thicket in the south the coconuts are more sparse and the canopy becomes more open with a greater proportion of *Hernandia*, *Morinda* and other trees. These conditions favour *Ricinus* and *Gossypium hirsutum*.

Herb community of open areas

The airstrip trace and an open area to the south of the settlement have been cleared and part of the airstrip is used seasonally for maize cultivation. A dense herb layer develops in which *Tridax* and *Stachytarpheta* are dominant and *Gossypium* forms dense patches.

West facing coastal hedge

The west coast is fringed with tall *Scaevola sericea* and *Tournefortia argentea* with occasional *Casuarina equisetifolia*. *Lepturus repens* and *Boerhavia* sp. underlie the hedge and, to the north of settlement, form a sparse cover on the beach crest. To the south of the beach, *Scaevola* thicket with some *Tournefortia* reaches the edge of the low cliffs, fronted only by a narrow and discontinuous band of low herbs including *Fimbristylis cymosa*, *Sida parvifolia*, *Passiflora*, *Tridax*, *Boerhavia*, *Euphorbia prostrata* and *Dactyloctenium* sp.

East facing coastal hedge

The coastal hedge on the east coast is dominated by *Scaevola* which extends back to form a dense thicket (see below). *Guettarda speciosa* is common in the north, with some *Tournefortia*. *Ipomoea macrantha*, *I. pes-caprae* and *Lepturus* are also present. Further south the *Scaevola* is lower and is mixed with occasional stunted *Tournefortia* and *Casuarina*. A thin and discontinuous band of herbs is found on the cliff edge, dominated by *Fimbristylis* and *Cyperus ligularis* whilst *Sida* and *Stenotaphrum micranthum* are also present. *Euphorbia prostrata* grows on the unstable surface of the cliff face.

Scaevola thicket

The *Scaevola* of the beach hedge extends back to form a dense thicket

from the north east, where it has been partially cut for the airstrip, to the south where it extends right across to the west coast. The thicket reaches a height of 4 m and there is a sparse understorey of grasses and herbs.

List of plants

65 species of vascular plants were noted, excluding those under cultivation. The following are all sight records, although specimens were retained for identification in Mahe if a positive identification could not be made at the time. The names used here have been checked by F. R. Fosberg, and conform to those in others of this series of reports.

ACANTHACEAE

Asystasia genetica (L.) T Anders.

(Probably *A. multiflora* Klotzsch or *A. bojeriana* Nees)

Patchily distributed but dominant where present in the coconut grove.

AGAVACEAE

Furcraea foetida (L.) Haworth

Patches, probably originally planted but now abandoned, are found at both ends of the airstrip trace and behind the beach hedge to the south of the settlement.

AMARANTHACEAE

Achyranthes aspera L.

Frequent in the coconut grove and in cleared areas; also occurring under the beach hedge of the northwest coast.

Amaranthus dubius Mart. ex Thell.

Common around the settlement and in the coconut grove.

APOCYNACEAE

Catharanthus roseus (L.) G. Don

Frequent in the coconut grove and cleared areas. Only the white-flowering variety occurs.

Neisosperma oppositifolia (Lam.) Fosb. & Sachet

Frequent within the coconut grove and present in the *Scaevola* thicket.

ARACEAE

Alocasia macrorrhiza (L.) G. Don

Occasional throughout the coconut grove.

ARECACEAE (PALMAE)

Cocos nucifera L.

The dominant species of the coconut grove. Scattered palms are also found within the *Scaevola* thicket but are poor.

ASCLEPIADACEAE

Tylophora asthmatica Wight & Arn.

Recorded by Piggott (1969) as the predominant species in the coconut grove, but not recorded in 1979 and 1980.

ASTERACEAE (COMPOSITAE)

Bidens pilosa L.

Infrequent in the coconut grove.

Tridax procumbens L.

Widespread, being common in the coconut grove and co-dominant with *Stachytarpheta* in cleared areas. It also occurs on the cliff edge of the southwest coast.

BORAGINACEAE

Cordia subcordata Lam.

Present in the coconut grove where palms are thinly distributed, particularly adjacent to the airstrip trace.

Tournefortia argentea L.f.

Common in the coastal hedge on the northern part of the island, but less frequent in the south.

CAPPARIDACEAE

Cleome gynandra L.

Found only around the settlement, on paths and on heaps of guano brought from Desnoeuufs.

CARICACEAE

Carica papaya L.

Very common in the coconut grove, forming an open understorey ca. 3 m tall under the palms.

CASUARINACEAE

Casuarina equisetifolia L.

Tall trees along the west coast, and a small grove at the cemetery in the north. Scattered individuals grow along the east coast and particularly behind the *Scaevola* thicket on the edge of the coconut grove.

CLUSIACEAE (GUTTIFERAE)

Calophyllum inophyllum L.

A single tree was located on the inland margin of the *Scaevola* thicket on the east side of the island.

COMMELINACEAE

Commelina benghalensis L.

Present under the coconut grove but patchily distributed.

CONVOLVULACEAE

Ipomoea batatas (L.) Lam. ?

A single plant in the coconut grove, scrambling over blocks of phosphatic limestone rubble.

Ipomoea macrantha Roem. & Schultes

Present in the beach hedge on the north coast and in margins of the coconut grove on the east side of the island.

Ipomoea pes-caprae (L.) R. Br.

Present in the cleared areas but most common on the seaward edge of the coastal hedge on the north and east.

CRASSULACEAE

Kalanchoe pinnata (Lam.) Pers.

Frequent but patchily distributed within the coconut grove.

CUCURBITACEAE

Cucurbita moschata (Duch. ex Lam.) Poir

Cultivated around settlement and occasional in the herb layer of the coconut grove.

CYPERACEAE

Cyperus dubius Rottb.

Common in the coconut grove, particularly along paths.

Cyperus ligularis L.

Present as scattered tussocks in the cleared areas but most frequent on the cliff top of the east coast.

Fimbristylis cymosa R. Br.

Dominant on the edge of cliffs on the southeast and southwest coasts.

EUPHORBIACEAE

Acalypha indica L.

Common in the coconut grove, and also present in open areas and under the *Scaevola* thicket.

Euphorbia hirta L.

Abundant in the coconut grove and in open areas.

Euphorbia prostrata Ait.?

Common along paths and in the coconut grove. It also occurs in sparsely vegetated areas and along the cliff edges.

Pedilanthus tithymaloides (L.) Poit.

Two patches were found, one within the settlement and one by the wells in the coconut grove.

Phyllanthus amarus Schum. & Thonn.

Common in the coconut grove, especially along paths, and present in cleared areas.

Phyllanthus sp.

Frequent in the coconut grove; also occurring in open areas.

Ricinus communis L.

Frequent within the coconut grove, becoming more common in open areas.

FABACEAE (LEGUMINOSAE)

Cassia occidentalis L.

Scattered plants within the coconut grove.

Leucaena leucocephala (Lam.) de Wit.

Frequent as scattered bushes under the coconut grove. Tall *Leucaena* dominate a small area to the south of the settlement adjacent to the *Scaevola* thicket.

Sesbania sericea (Willd.) Link ?

Two specimens were found within the coconut grove.

Vigna sp. ?

Uncommon in the coconut grove: only two specimens found.

GOODENIACEAE

Scaevola sericea Vahl

Found around the perimeter of the island where it dominates the coastal hedge and forms a dense thicket covering the whole southern portion of the island. Scattered inliers occur on the margins of the coconut grove and in cleared areas.

HERNANDIACEAE

Hernandia sonora L.

Trees up to 12 m tall are common in the coconut grove, but less frequent in the *Scaevola* thicket.

LECYTHIDACEAE

Barringtonia asiatica (L.) Kurz

Two specimens found, one in the settlement and one in the coconut grove.

LYTHRACEAE

Pemphis acidula Forst.

Described by Baker (1963) as covering the southeast part of the island, presumably in error for *Scaevola*.

MALVACEAE

Abutilon indicum (L.) Sweet ?

Uncommon; found within the coconut grove and in open areas.

Gossypium hirsutum L.

Present in the coconut grove but more common in the cleared areas.

Hibiscus tiliaceus L.

Only one specimen found, on the edge of the airstrip trace.

Sida pusilla Cav.

Found throughout the island, being common in the coconut grove and open areas, frequent along the coast, and present under the *Scaevola* thicket.

Sida sp.

Common in the coconut grove.

MORINGACEAE

Moringa oleifera Lam.

A number of trees have been planted round the settlement.

MUSACEAE

Musa sapientum L.

One patch, within the coconut grove.

NYCTAGINACEAE

Boerhavia spp.

Found throughout the island, being abundant under the coconut grove and in open areas. It occurs along the west coast and under the *Scaevola* thicket, but is not common on the east coast. A white-flowering form predominates, but the pink-flowering type (*B. repens* L. ?) is infrequently found in the coconut grove.

Mirabilis jalapa L.

Frequent around the settlement but uncommon in the coconut grove.

PASSIFLORACEAE

Passiflora suberosa L.

Abundant in the coconut grove, both on the ground and ascending into the bushes. It is also common in open areas, and occurs along both southeast and southwest coasts.

POACEAE (GRAMINEAE)

Dactyloctenium ctenoides (Steud.) Bosser

Sparsely distributed in the coconut grove. Dead grass in the open areas and on the south and east coasts suggests that this species is more abundant at other times of the year.

Digitaria setigera Roth.

Frequent in the coconut grove and present in cleared areas.

Eleusine indica (L.) Gaertn. ?

Frequent in the coconut grove, and also present in open areas and under *Scaevola* thicket.

Eragrostis subaequiglumis Renvoize

Common in the coconut grove where ground cover is sparse, and especially along paths. Also occurs in cleared areas.

Lepturus repens (G. Forst.) R. Br.

Found on the coast around the entire island, and also growing in the *Scaevola* thicket.

Panicum maximum Jacq.

Planted in the settlement and also found in isolated patches within the coconut grove.

Stenotaphrum dimidiatum (L.) Brongn.

Present on the east coast.

PORTULACACEAE

Portulaca oleracea L.

Present in the coconut grove, especially along paths, and infrequent on the east coast.

RUBIACEAE

Guettarda speciosa L.

Common in the coastal hedge of the northeast but not recorded elsewhere.

Morinda citrifolia L.

Very common as low bushes or trees in the coconut grove. Also occurs as scattered bushes in the open areas and in the *Scaevola* thicket.

SOLANACEAE

Capsicum frutescens L.

Three bushes, probably planted, are found in the coconut grove.

Datura metel L.

Present as scattered plants in the coconut grove.

Solanum nigrum L.

Infrequent in the coconut grove.

TURNERACEAE

Turnera ulmifolia L.

Frequent in the coconut grove.

URTICACEAE

Laportea aestuans (L.) Chew

Frequent in the coconut grove.

VERBENACEAE

Lippia nodiflora (L.) Rich

Dominant in one small area close to the settlement, but not recorded elsewhere.

Stachytarpheta jamaicensis (L.) Vahl

Common in the coconut grove and generally co-dominant with *Tridax* in the cleared areas.

Vertebrate fauna

Reptiles

?*Gehyra mutilata*

A nocturnal light brown gecko, common in the settlement buildings.

Phelsuma madagascariensis

Common in the coconut grove and beach hedge.

Chelonia mydas

Green turtle

A small number are said to breed on Marie-Louise, where suitable beaches extend from settlement to the northern point. One set of pits was found by settlement in 1979 and several traces of earlier visits were evident around the northern point by the cemetery. Two sets of pits were found in 1980, one several months old and one recent. Both were by the cemetery.

Eretmochelys imbricata

Hawksbill turtle

Around 15 females are said to land on the island each year between October and February.

Both turtle species are taken whenever opportunity arises.

Birds*Puffinus l'herminieri*

Audubon's Shearwater

Not seen. Said to occur although not to breed (O. Souris, pers comm.).

Puffinus pacificus

Wedge-tailed Shearwater

Two small colonies of c.45 burrows each were found on the east coast and at Point Fouquet, the southernmost tip of the island. Both colonies were situated in open ground on the cliff edge and although no birds were seen some burrows appeared to be in use.

Sula leucogaster

Brown Booby

An adult plumaged bird roosted in coastal *Casuarina* on the night of 19 July 1980. An unidentified immature booby passed over the island on the evening of 14 June 1979.

Fregata sp.

Frigatebirds

Three immature frigates passed over the island in the evening of 19 July 1980. It was not established if Marie-Louise is used as a roost although this is most likely.

Bubulcus ibis

Cattle Egret

Three birds were seen on the airstrip in 1980. The population appears to be small.

Gallus gallus

Feral chicken

A number of chickens have gone wild and range through the coconut grove. Their wariness and willingness to fly distinguishes them from the domesticated birds.

Pluvialis squatarola

Grey Plover

Present, foraging on the airstrip trace and on the east coast.

Arenaria interpres

Turnstone

Common throughout the island and on the coast. The manner in which birds freely perched in dead bushes where ground cover was dense was remarkable.

Sterna anaethetus

Bridled Tern

Several hundred birds roost in the *Casuarina* of the west coast but it was not established if breeding took place.

Sterna fuscata

Sooty Tern

Sooty terns regularly pass over the island but do not land.

Gygis alba

White Tern

Common throughout the island and all stages of breeding observed. The population was estimated at several thousand pairs.

Anous tenuirostris

Lesser Noddy

Common, several thousands being estimated as present. Breeding was noted in casuarinas behind the *Scaevola* thicket on the east coast and roosting birds were found throughout the coconut grove.

Anous stolidus

Common Noddy

Common, breeding in coconuts throughout the island. With roosting birds, the population was estimated to be in the region of several thousand birds.

Passer domesticus

House Sparrow

Common around the settlement but not in the coconut grove. A nest was under construction in the eave of a house in July 1980.

Foudia madagascariensis

Madagascar Fody

Very common in the coconut grove and in feeding flocks on the airstrip trace.

Introduced "grey partridge" and quail were recorded as uncommon in 1955 (Ridley and Percy 1958) but neither species, the precise identification of which is uncertain, was seen in 1979 or 1980. Both have probably died out.

Mammals*Mus* sp. (?*musculus*)

Mouse

Mice are common but there are no rats.

Sus scrofulus

Feral pig

A number of feral pigs occur, one being seen in the coconut grove in dense cover. They are extremely wary.

Dolphins were seen off settlement beach on both visits.

Land use history

Marie-Louise is government-owned but has been leased and permanently settled since the late 19th century. The first major activity was the exploitation of guano and the island had two co-lessees in 1905 with a total population of 86. One lessee handled the guano extraction and at least 3500 tons were exported in late 1905 alone (Tonnet 1906). By 1906 it was reported that economically workable deposits were exhausted although an estimated 3000 tons remained in 1963 of which 1500 tons could be taken for local use without damaging agricultural potential (Baker 1963). In fact guano has been imported in recent years for agricultural purposes from Desnoeuufs.

The second lessee in 1905 was responsible for agricultural development. 800 coconuts and the *Casuarina* on the west coast had already been planted and effort was maintained as holes were dug through the sandstone for further plantings. The wells sunk from chambers excavated under the sandstone beds also probably date from this period. Following the exhaustion of the guano, agriculture and fishing became the sole activities supporting a population of about 20. Sixty years later, Piggott (1969) commented that the estate was neglected and it remained in much the same condition in 1979-80 although pigs, poultry, vegetables, maize, tortoiseshell and saltfish were produced for island use and to augment copra exports. The airstrip trace in the north-east was cut some 10-15 years ago but the work was not completed.

The Island Development Company took the lease of Marie-Louise in 1981 and, given the emphasis placed by government on outer island development and the influx of resources and expertise under the new management, agricultural activity is expected to be intensified in future.

Discussion

The Du Roslan expedition, passing by in 1771 and giving Marie-Louise its name, described the island as well wooded (Fauvel 1908) and the present vegetation is a product of a century of human activity superimposed upon the effects of differing soils and degree of exposure to wind and wind-borne salt. The activity with the most far-reaching ecological impact must have been the guano exploitation involving the removal of any vegetation growing on it and the virtual loss of all top soil, and in 1905 this formerly wooded island was clothed only in small bushes and young coconuts (Tonnet 1906). The subsequent development of the vegetation has been controlled by management as an agricultural plantation.

The flora of Marie-Louise is now unremarkable and, of the 66 plant species noted, 34 are generally considered to be introductions to the Seychelles as cash crops, vegetables, ornamentals, for medicinal purposes or as weeds. This is an over-simplification as some native species are weedy or widely planted and may not have formed part of the original Marie-Louise flora whilst others are of uncertain status but, despite these difficulties in categorisation, a rough analysis of the provenance of the flora can be made:

Vegetation type	No. native species	No. introduced species	total	% introduced species
All types	31	34	65	51.5
Coconut grove	24	33	57	58
Cleared areas	9	12	21	57
Coastal hedge, W.	9	3	12	25
Coastal hedge, E.	13	2	15	13
<i>Scaevola</i> thicket	7	1	8	12

If the proportion of introduced species can be taken as an indicator of habitat disturbance, it is evident that the coastal hedge and *Scaevola* thicket have been altered least despite the presence of pits dug under the latter, suggesting cutting back in an effort to increase coconut production. It is likely then that the hedge and thicket are essentially persistent features of the original vegetation although there has been some invasion by hardy weeds, particularly on the more sheltered west coast.

It is also certain that the coastal hedge and its inland extension as *Scaevola* thicket is vital in protecting the coconut grove and, before that, the forest noted in 18th century. This forest must have consisted at least of *Hernandia*, *Barringtonia*, *Neisosperma*, *Morinda* and *Cordia*, and probably of other species incapable of withstanding the combined effects of removal of the guano in which they grew and the subsequent repeated coppicing practiced as an adjunct to coconut cultivation. That the forest was not more widespread is suggested by the difficulty with which native trees establish themselves within the *Scaevola* thicket even though all species concerned are capable of growth in its soils. The critical factor appears to be exposure to salt spray.

The seabirds are perhaps the most interesting ecological feature of the island. Despite the comments of Ridley and Percy (1958) who did not consider Marie-Louise to be a seabird island from the egg cropping viewpoint and recorded Lesser and Common Noddies as breeding in small numbers only, the island actually supports one of the largest concentrations of tree nesting terns in the Amirantes even though the greater number may only roost rather than breed. This population complements the similar concentrations of ground nesting and tunnelling sea-birds in

the other southern Amirante Islands of Desnoeufs, Boudeuse and Etoile. The two noddies are taken for food by the island inhabitants but it is highly unlikely that this activity has any marked effect on the tern populations and only the small colonies of wedge-tailed shearwaters can be considered to be at risk through direct human predation. The important factors maintaining the number of birds on Marie-Louise are the absence of rats and the presence of the coconut grove which provides breeding and roosting sites and would continue to do so even under more intensive management. As already suggested, the existence of the coconut grove is dependant upon the shelter of the beach hedge and *Scaevola* thicket.

There is no real conflict between agricultural development and wildlife conservation interests on Marie-Louise. Indeed, the well-being of the coconut grove is to the advantage of all and the undesirability of the introduction of rats is generally accepted. However, the critical importance of the integrity of the coastal vegetation must be stressed. The removal or reduction of coastal hedge or *Scaevola* thicket to free land for agriculture without the establishment of some other adequate screen such as a *Casuarina* belt would be counter-productive on Marie-Louise and also considerably diminish the species and habitat diversity among the southern Amirantes.

Acknowledgements

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References

- Baker, B. H. 1963. Geology and mineral resources of the Seychelles archipelago. *Geol. Surv. Kenya Mem.* 3.
- Fauvel, A. A. 1909. *Unpublished documents on the history of the Seychelles islands anterior to 1810.* Government Printing Office, Mahe.
- Piggott, C. J. 1968. A soil survey of the Seychelles. *Tech. Bull.* 2, Land Resource Division, Directorate of Overseas Surveys, Tolworth.

Piggott, C. J. 1969. A report on a visit to the outer islands of Seychelles between October and November 1960. Land Resources Division, Tolworth, Surrey.

Ridley, M.W. and Percy, R. 1958. The exploitation of seabirds in Seychelles. Col. Res. Studies 25 (H.M.S.O.).

Tonnet, A. 1906. Report on a visit to the outlying islands. Seychelles National Archives, manuscript C/SS/5.

by J. R. Wilson

Introduction

Island of ... is the southernmost of the Seychelles. It is situated ... from its nearest neighbour, Marie-Louise, and ... in the granitic Seychelles. It is roughly circular ... with an area of 39.7 ha and a maximum elevation of 4 m ... its slightly raised perimeter. There is one main landing on the north ... a beach of ... and a ... of ... from ... to ... of ... A ... of ... on the ... side.

The island has received several visits by ... over the past 25 years. Percy and Ridley (1958) described the natural history in detail and ... a ... of ... and ... (1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980).

Geology and soils

The island is believed to be an uplifted ... which ... originally formed as ... rock, ... in ... (Piggott 1962, 1963). ... of ... and ... the older ... have been ... of ... and ... of ... in ... of ... and ... of ...