VOLUME 4
PART 2

MEMOIRS OF THE QUEENSLAND MUSEUM
CULTURAL HERITAGE SERIES

17 OCTOBER 2008

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National Library of Australia card number
ISSN 1440-4788

A Guide to Authors is displayed at the Queensland Museum web site

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Typeset at the Queensland Museum

CHAPTER 20

TERRESTRIAL VEGETATION OF GELAM'S HOMELAND, MUA

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Wannan, B. 2008 10 17: Terrestrial vegetation of Gelam's homeland, Mua. *Memoirs of the Queensland Museum, Cultural Heritage Series* **4**(2): 481-489. Brisbane. ISSN 1440-4788.

The terrestrial vegetation of Gelam's homeland (north-east Mua) occurs on three main landforms and geology: Quaternary coastal sand deposits, residual deposits and Badu Granite. Vegetation on these consists of grassland, woodland, and vine forest which occur as a mosaic that appears to be maintained by moisture availability. A greater complexity of vegetation and landzone types is here recognised in contrast to previous vegetation mapping. It is evident from the landscape complexity of Mua that a detailed assessment will be required to support an accurate conversion of existing vegetation units to regional ecosystems. ❑ *Vegetation mapping, woodland, grassland, vine forest, regional ecosystem, landzones*.

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Plant collections have been made in the Torres Strait area since the 18th century, but the area remains poorly-known botanically. Early accounts of the vegetation are mostly anecdotal descriptions of explorers' voyages (Jukes, 1847; McGillivray, 1852). More recent accounts of the vegetation are generally restricted to orchids (Davis, 1945; Young, 1947; Smythe, 1970; Lavarack, 1989), a particular island (Garnett & Jackes, 1983), or short accounts in natural history magazines (Stocker, 1982; Wilby, 1988). Detailed accounts of the plant biogeography of Papua New Guinea to the immediate north of Torres Strait, and mainland Australia to the south, were provided in Walker (1972) as part of an overview of the natural and cultural history of Torres Strait.

The vegetation of Torres Strait largely reflects the four main geophysical island groups: western and southern continental islands, eastern volcanic islands, central coral islands, and northern mud islands. The western and southern continental islands have the highest diversity of plant communities and species. Amongst these the larger islands, for example Mua and Badu, have the broadest array of plant diversity in Torres Strait.

The vegetation of Mua was mapped by Lavarack (1989) as part of an account of the orchid flora of Torres Strait. Vegetation communities comprised: notophyll vine forest, closed forest on rocky knolls, open forest on volcanics, open forest on granites, mixed closed forest and grassland, grassland, melaleuca forests, and melaleuca woodland.

Lavarack's (1989) mapping was later used as the basis for mapping of Mua by Neldner & Clarkson who mapped (1995) and described (no date) the vegetation of Cape York Peninsula and Torres Strait islands at 1:100,000 scale.

Neldner & Clarkson's (1995) work has been used to create a preliminary coverage of regional ecosystems for the area that is currently being checked and refined by the Queensland Herbarium.

Regional ecosystems are vegetation communities within a bioregion that are consistently associated with a combination of geology, landform and soil (Sattler & Williams, 1999; Environmental Protection Agency, 2005). Each regional ecosystem is provided with a three-part code (e.g. 3.1.6). The first part (e.g. 3) refers to a biogeographic region in which it is found (i.e. 3: Cape York Peninsula, which is one of 13 bioregions recognised in Queensland). The second part refers to the landzone in which it is found (i.e. 1: deposits subject to periodic tidal inundation). There are 12 landzones that are simplified geology/substrate-landform units across Queensland (Neldner et al., 2004). The third part (e.g. 6) is the ecosystem number which describes the vegetation by the predominant stratum, which is the one that is assessed as

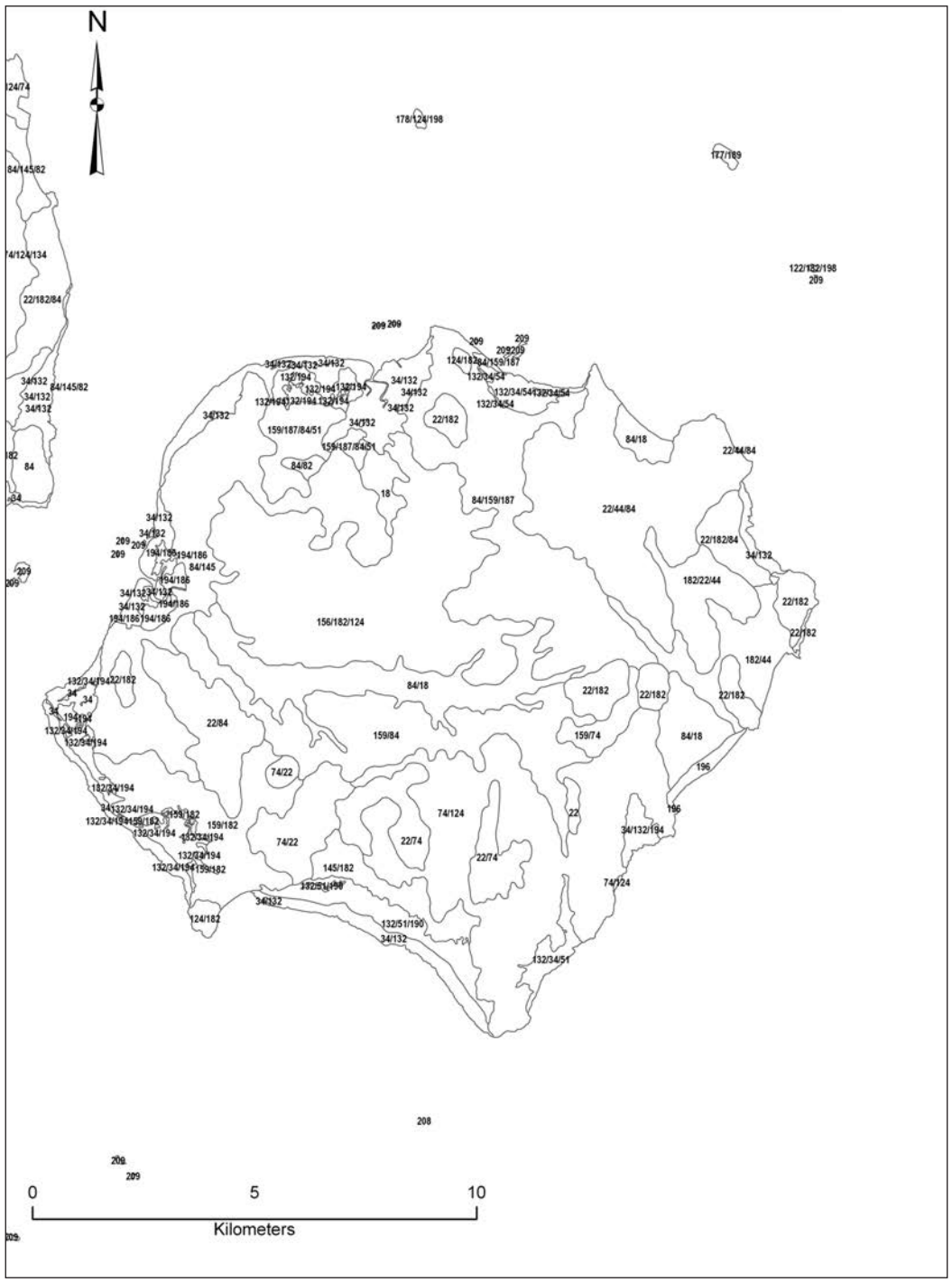

FIG. 1. Vegetation communities on Mua (from Neldner & Clarkson, 1995).

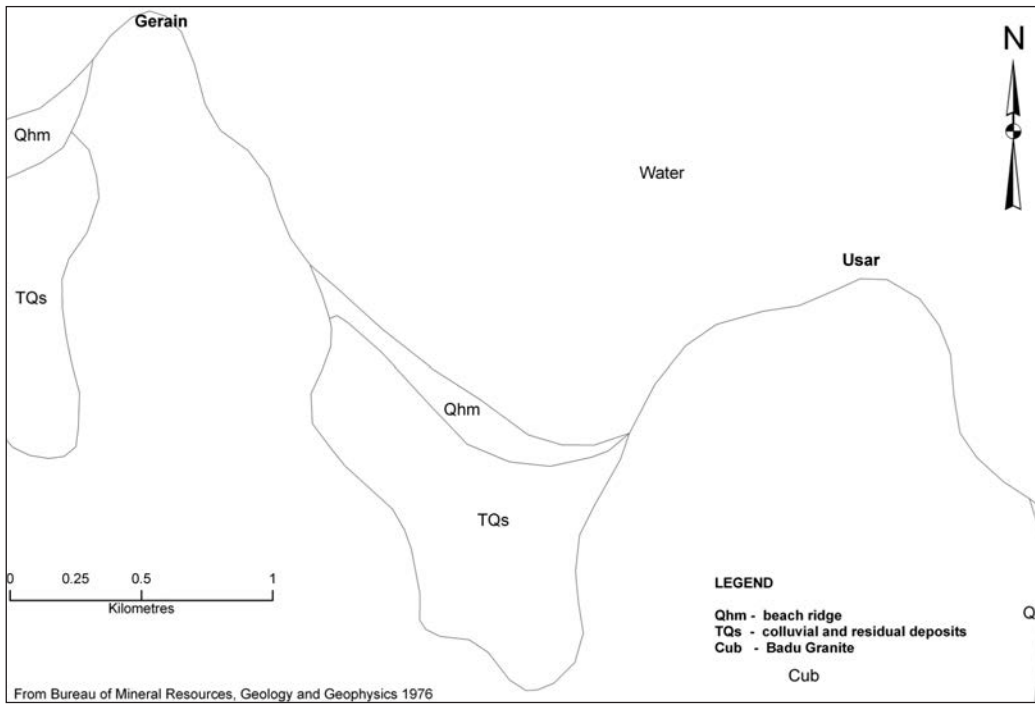

FIG. 2. Geological mapping for the Gerain-Bulbul area.

contributing the most above-ground biomass, in this case: 6: Sparse herbland or bare saltpans.

Fig. 1, below, shows the Neldner & Clarkson vegetation units on Mua. These are also described in Table 1 below with their assigned preliminary regional ecosystems. Those occurring adjacent to Gelam's homeland are indicated in bold.

In 2003, Wannan & Buosi reported on the environmental values of Mua. Twenty-nine detailed vegetation sites were undertaken to provide more accurate descriptions of the vegetation communities. They found that the Queensland Herbarium vegetation map units were generally accurate but suggested some minor amendments. Additionally, they found that as a consequence of the scale of mapping, smaller vegetation components were overlooked.

The aim of the current study is to provide a more detailed vegetation description and map in the vicinity of Gelam's homeland to support the cultural history project and to improve knowledge of the Torres Strait flora.

MATERIALS AND METHODS

Fieldwork was undertaken between 26-30 November 2004 and consisted of specimen collection and floristic observation sites. The latter included Queensland Herbarium CORVEG sites undertaken according to Neldner et al. (2004) and rapid observation sites. In general, the timing of fieldwork resulted in under-sampling and recording of understorey and groundcover species.

Observations on landzones (i.e. geology and landforms) were undertaken in the north-western part of the study area in conjunction with the team's geomorphologist, Meredith Orr (see Orr, chapter 18, this volume).

RESULTS

LANDFORMS AND GEOLOGY. The landforms between Gerain and Usar consist of hills to the west, coastal ridges and dunes behind the beach, and low swampy areas between the two. The Bureau of Mineral Resources (1976) identified the geology of these areas as Badu Granite (Cub), beach ridge (Qhm), and residual deposits (TQs), respectively (Fig. 2).

TABLE 1. Neldner and Clarkson (1995) vegetation units and preliminary regional ecosystems for Mua.

Neldner and Clarkson (1995) Vegetation Units		Regional Ecosystem[1] (preliminary assignment)	Landzone[2] (preliminary assignment)
Description	Occurrence on Mua		
18 Evergreen notophyll vine forest on major streams	Tutalia Creek	3.3.5 Evergreen notophyll vine forest occurs on alluvia.	3. Quaternary alluvial systems
22 Evergreen notophyll vine forest dominated by *Welchiodendron longivalve* and *Acacia polystachya*	Hills	3.12.4 Notophyll vine forest of *Welchiodendron longivalve* on Torres Strait Islands.	12. Hills and lowlands on granitic and other pre Cainozoic igneous rocks
34 *Rhizophora stylosa* ± *Bruguiera gymnorhiza* ± *Avicennia marina* var. *eucalyptifolia* closed-forest	Intertidal areas	3.1.1 Closed forest of *Rhizophora stylosa* + *Bruguiera gymnorhiza*	1. Deposits subject to periodic tidal inundation
44 *Corymbia tessellaris, C. clarksoniana* ± *Lophostemon suaveolens* ± *Acacia crassicarpa* open-forest to woodland	West of St Pauls	3.3.8 *Corymbia tessellaris, C. clarksoniana* open forest on coastal alluvial plains.	3. Quaternary alluvial systems
	Hills in the north-east.	3.12.9 *Corymbia tessellaris, C. clarksoniana* open forest on coastal ranges.	12. Hills and lowlands on granitic and other pre Cainozoic igneous rocks
51 *Melaleuca quinquenervia* open-forest	North-west of the island.	3.3.12 *Melaleuca quinquenervia* open forest associated with coastal swamps	3. Quaternary alluvial systems
54 *Acacia crassicarpa* ± *Syzygium suborbiculare* ± *Parinari nonda* ± *Acacia* spp. woodland	Northern side	3.2.5 *Acacia crassicarpa* ± *Syzygium suborbiculare* ± *Parinari nonda* woodland. On beach ridges	2. Quaternary coastal sand deposits
74 *Corymbia hylandii* var. *campestris* ± *Welchiodendron longivalve* ± *Eucalyptus* spp. woodland	Around Kubin	3.12.11 *Corymbia hylandii* subsp. *peninsularis* +*Welchiodendron longivalve* woodland on Torres Strait Islands.	12. Hills and lowlands on granitic and other pre Cainozoic igneous rocks
82 *Corymbia nesophila* ± *E. crebra* ± *E. brassiana* woodland	North-west	Unassigned	Unassigned
84 *Corymbia novoguinensis* ± *C. tessellaris* ± *C. nesophila* woodland	Foot of hillslopes of north & western parts	3.5.5 *Corymbia novoguinensis* + *C. tessellaris* woodland on northern Cape York Peninsula.	5. Plains and plateaus on Tertiary land surfaces, generally with medium to coarse textured soils
124 Evergreen notophyll vine forest dominated by *Welchiodendron longivalve* ± *Acacia polystachya* ± *Canarium australianum*	Hills in the south	3.12.20 Evergreen notophyll vine forest dominated by *Welchiodendron longivalve* on headlands.	12. Hills and lowlands on granitic and other pre Cainozoic igneous rocks
132 *Ceriops tagal* ± *Avicennia marina* var. *eucalyptifolia* low closed-forest	Intertidal areas	3.1.3 *Ceriops tagal* + *Avicennia marina* low closed forest	1. Deposits subject to periodic tidal inundation
145 *Melaleuca viridiflora, Asteromyrtus symphyocarpa, Corymbia novoguinensis* ± *M. stenostachya* low woodland	Southern side	3.5.15 *Melaleuca viridiflora, Asteromyrtus symphyocarpa* low woodland on colluvial plains.	5. Plains and plateaus on Tertiary land surfaces, generally with medium to coarse textured soils
156 *Melaleuca stenostachya* ± *M. viridiflora* low open-woodland	Middle of the island	3.5.17 *Melaleuca stenostachya* + *M. viridiflora* low open woodland on flat plains.	
159 *Melaleuca viridiflora* ± *Petalostigma pubescens* ± *emergent Corymbia clarksoniana* low open-woodland	Poorly drained the centre of the island	3.3.50 *Melaleuca viridiflora* + *Petalostigma pubescens* low open woodland on low plains.	3. Quaternary alluvial systems
182 *Imperata cylindrica* ± *Mnesithea rottboellioides* ± *Arundinella setosa* closed-tussock grassland	Widespread	Unassigned or 3.3.57 *Imperata cylindrica* + *Mnesithea rottboellioides* closed tussock grassland on coastal plains	
186 *Themeda arguens* ± *Dichanthium sericeum subsp. sericeum* ± *Capillipedium parviflorum* ± *Fimbristylis* spp. ± *Sorghum* spp. closed-tussock grassland	West side of the island	3.3.60 *Themeda arguens, Dichanthium sericeum* closed tussock grassland on marine plains.	
187 Grassland/sedgeland with emergent *Pandanus* spp. closed-tussock grassland to open-sedgeland	Throughout	3.3.62 Grassland/sedgeland with *Pandanus* spp. confined to Torres Strait Islands.	
190 *Eleocharis dulcis* closed-sedgeland	Southern side of the island	3.3.63 Closed sedgeland dominated by Eleocharis dulcis on seasonally flooded marine plains	
194 Bare saltpans with areas of *Halosarcia* spp. ± *Xerochloa imberbis* ± *Suriana maritima* or *Sesuvium portulacastrum* open-herbland	Western side of the island	3.1.6 Sparse herbland or bare saltpans	1. Deposits subject to periodic tidal inundation
196 Mixed herb species sparse-herbland ± emergent low trees	South of Saveka Point	3.2.25 Sparse herbland of mixed herbaceous species on foredunes and beach ridges	2. Quaternary coastal sand deposits

1. Each regional ecosysems is provided with a three part code (e.g. 3.1.6). The first part (3.1.6) refers to a biogeographic region in which it is found (i.e. 3: Cape York Peninsula). The second part refers to the land zone (3.1.6) on which it occurs (i.e. 1: Deposits subject to periodic tidal inundation). The third part (3.1.6) is the ecosystem number and denotes the vegetation (i.e. 6: Sparse herbland or bare saltpans).

2. Land zone is a simplified geology/substrate-landform classification for Queensland (Environmental Protection Agency 2005, Neldner et al. 2004)

TABLE 2. Landforms and Geology between Gerain and Usar.

Landform)	Geology	Corresponding Landzone
Coastal ridges and swales behind beach	Beach ridge (Qhm)	2. Quaternary coastal sand deposits
Flat sandy area between coastal ridges and base of hills	Residual deposits - TQs (+ minor contribution from Stream sediments - Qha/ river and flood plain alluvium - Qa)	5. Plains and plateaus on Tertiary land surfaces
Rocky hill-slopes	Badu Granite (Cub)	12. Hills and lowlands on granitic and other pre Cainozoic igneous rocks

Site work recorded the occurrence of beach ridges and granite hill-slopes, and a flat sandy area between the two which appears seasonally wet due to creek drainage from the Alec, Lala and Aros Hills to the south. A thin alluvial cover of finer sediments overlies weathered granite in the north, and alluvial sediments are deeper behind the beach ridges than to the south. Weathered granite is exposed with distance from the creek beds and also in the channels of some creeks.

Table 2 summarises landforms and observed geology and their correspondence with landzones from the regional ecosystem framework. These areas are mapped on Fig. 3 and shown on Fig. 4.

VEGETATION. The vegetation between Gerain and Usar consisted of five vegetation communities on the three landzones described above.

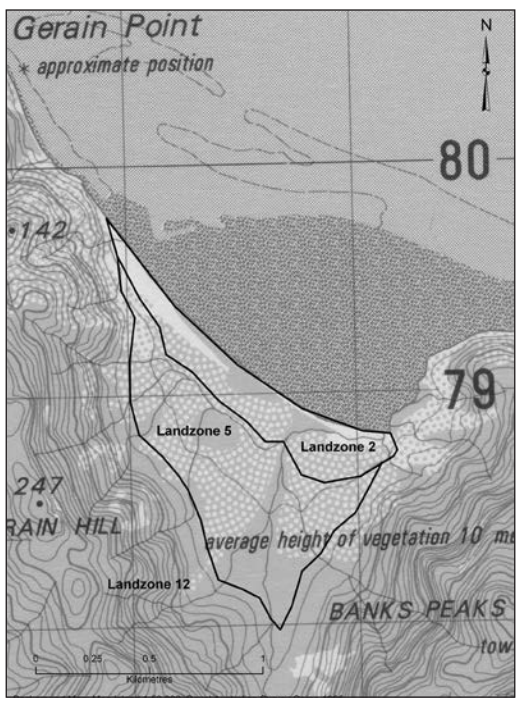

FIG. 3. Landzones for the Gerain-Bulbul area.

LANDZONE 2 - QUATERNARY COASTAL SAND DEPOSITS

Grassland. This tussock grassland community occurs behind the fore dune and is sometimes intermixed with vine forest and open woodland on Quaternary coastal sand deposits (Fig. 5). The community is dominated by *Heteropogon triticeus, Perotis rara* and *Aristida* spp. and may be maintained by burning. Some of the species in this community were unidentifiable at the time of sampling.

The community corresponds most closely to Vegetation Unit 196 (Mixed herb species sparse-herbland ± emergent low trees) and RE 3.2.25. Wannan & Buosi (2003) sampled this vegetation type near Savika Point and recorded an additional range of species, namely: *Mnesithea rottboellioides, Sorghum plumosum, Cenchrus elymoides* var. *brevisetosus, Vitex rotundifolia*, *Bulbostylis barbata, Cyperus* sp., *Tacca leontopetaloides, Commelina ensifolia, Vigna marina, Ipomoea pes-caprae, Wahlenbergia caryophylloides* and *Tribulus cistoides*.

Wannan & Buosi (2003) noted that the community would better be described as grassland. This observation is supported by the site data for this project and, in fact, by Neldner & Clarkson (no date) whose description of the Structural

FIG. 4. Landscape of Gelam's homeland, looking north towards Gerain.

FIG. 5. Grassland on Quaternary coastal sands with fore dune vine forest (left) and vine forest/ woodland on older dunes (right).

formation range for this unit is: Open-tussock grassland 50%, herbland 25%, low open-woodland 25%.

Woodland. This community grows to 15 metres in height on ridges behind the foredunes (Fig. 6). It is a grassy woodland dominated by trees of *Corymbia novoguinensis*, *Acacia crassicarpa, Parinari nonda, Corymbia tessellaris, Barringtonia calyptrata,* and *Bombax ceiba*. The understorey/groundlayer grasses are similar to those in the grassland above (e.g. dominated by *Heteropogon triticeus*).

The community corresponds most closely to Vegetation Unit 54 (*Acacia crassicarpa* ± *Syzygium suborbiculare* ± *Parinari nonda* ± *Acacia* spp. woodland) and RE 3.2.5. It differs from Neldner & Clarkson's (no date) description in the absence of *Syzygium suborbiculare* in the canopy layer.

Vine forest. This community is a closed forest that grows to 15 metres in height on foredunes and older ridges and swales (Fig. 6). Near Gerain it occurs as a thin band between the beach and the granite hill-slopes behind.

Canopy species include *Corymbia novoguinensis*, *Bombax ceiba, Garuga floribunda, Sterculia quadrifida, Erythrina variegata* and *Ficus microcarpa*. A lower tree/shrub layer includes *Pleomele angustifolia, Acacia* sp., *Terminalia* sp., *Cupaniopsis anacardioides, Parinari nonda, Eugenia reinwardtiana, Carallia brachiate, Premna serratifolia, Exocarpos latifolius, Opilia amentacea, Psychotria poliostemma, Archidendron grandiflorum, Diospyros calycantha, Cansjera leptostachya, Alectryon tomentosus, Diospyros* sp. (Mt White & P.I.Forster PIF14415), *Arytera bifoliolata, Alphitonia excelsa, Ptychosperma elegans* and *Parinari nonda.* Groundlayer species include *Lomandra banksii, Drynaria quercifolia, Asparagus racemosus* and *Tabernaemontana pandacaqui*. Vines include *Passiflora foetida* and *Pachygone ovata.* Epiphytes include *Pyrrosia longifolia*.

The small size of these patches and occurrence of *Corymbia novoguinensis* in this community suggests that these areas may be of recent occurrence or are subject to periodic burning.

When occurring on the beach front dune the canopy of this community is wind-pruned to 6 metres and is dominated by *Manilkara kauki.*

The community corresponds most closely to Vegetation Unit 122 (Evergreen notophyll vine forest dominated by *Manilkara kauki* ± *Mimusops elengi* ± *Terminalia* spp) and RE 3.2.28. Although

FIG. 6. Woodland and vine forest on older Quaternary coastal sands.

FIG. 7. Woodland on residual sands (TQs) between dunes and granite hill-slopes.

not previously recorded on Mua this unit has been recorded on nearby islands. Whilst the beach front examples of this community are a good match for Vegetation Unit 122, the floristics of the community on older hind ridges differ considerably from that described by Neldner & Clarkson (no date). Most notable is the canopy occurrence of *Bombax ceiba*, *Garuga floribunda* and *Sterculia quadrifida* which were not recorded at any site by Neldner & Clarkson (no date). Additionally, the absence of *Manilkara kauki* and the taller stature of this community on hind ridges suggest that it may constitute at least a different vegetation subunit.

LANDZONE 5 - PLAINS AND PLATEAUS ON TERTIARY LAND SURFACES

Woodland. This community occurs on the sandy flat areas between the base of the hills and the rear of the ridges (Fig. 7). It is a grassy woodland up to 20 metres in height dominated by *Corymbia novoguinensis, Parinari nonda, Corymbia tessellaris* and *Barringtonia calyptrata*. Smaller trees/shrubs include *Melaleuca viridiflora* and *Planchonia careya*. The groundcover was dominated by *Heteropogon triticeus, Arundinella setosa* and *Mnesithea rottboellioides.*

The community is a good match for Vegetation Unit 84 (*Corymbia novoguinensis* ± *C. tessellaris* ± *C. nesophila* woodland) based on Neldner & Clarkson's (no date) description for this unit and corresponds to Regional Ecosystem 3.5.5.

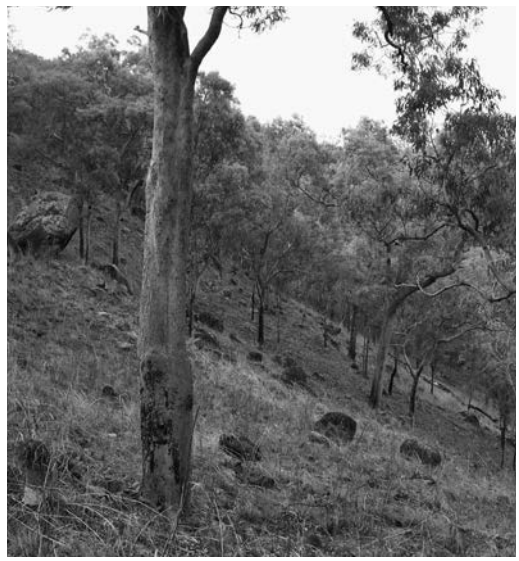

FIG. 8. Woodland on rocky hill-slopes of Badu Granite (Cub).

Vine forest. This community occurs in swampy areas near creeks between the base of the hills and the rear of the dunes. It is a closed forest up to 20 metres in height. Canopy species include *Dillenia alata, Melaleuca dealbata, Barringtonia calyptrata, Parinari nonda* and *Corymbia novoguinensis*. Smaller trees/ shrubs include *Licuala ramsayi, Pleomele angustifolia, Livistona* sp. and *Pandanus* sp.

This community appears to be a depauperate example of Vegetation Unit 18 (Evergreen notophyll vine forest on major streams) which corresponds to RE 3.3.5. Wannan & Buosi (2003) sampled this vegetation type near Tutalia Creek where it was a taller and more diverse forest. Both sites occur in the lower parts of landzone

TABLE 3. Vegetation communities between Gerain and Usar.

Landzone (& landform)	Communities	Corresponding Neldner & Clarkson vegetation unit (& preliminary regional ecosystem)
2. Quaternary coastal sand deposits (Dune and swale areas between the beach and alluvial back swamp)	Grassland	196 Mixed herb species sparse-herbland ± emergent low trees (RE 3.2.25),
	Woodland	54 *Acacia crassicarpa* ± *Syzygium suborbiculare* ± *Parinari nonda* ± *Acacia* spp. woodland (RE 3.2.5),
	Vine forest	122 Evergreen notophyll vine forest dominated by *Manilkara kauki* ± *Mimusops elengi* ± *Terminalia* spp. (RE 3.2.28).
5. Plains and plateaus on Tertiary land surfaces (sandy areas between dunes and base of hills)	Woodland	84 *Corymbia novoguinensis* ± *C. tessellaris* ± *C. nesophila* woodland (RE 3.5.5)
	Vine forest	18 Evergreen notophyll vine forest on major streams (no corresponding regional ecosystem)
12. Hills on granitic and other pre Cainozoic igneous rocks (Badu Granites)	Woodland	44 *Corymbia tessellaris, C. clarksoniana* ± *Lophostemon suaveolens* ± *Acacia crassicarpa* open-forest to woodland (or RE 3.12.9)
	Vine forest	22 Evergreen notophyll vine forest dominated by *Welchiodendron longivalve* and *Acacia polystachya* (or RE 3.12.4)

5 close to alluvial influence. TQs is certainly recognised as one of the minor substrates for Vegetation Unit 18 (Neldner & Clarkson, no date). The canopy species of both examples of this community on Mua differ from that described by Neldner & Clarkson (no date). So, it seems likely that this vegetation constitutes a new regional ecosystem.

LANDZONE 12 - HILLS AND LOWLANDS ON GRANITIC AND OTHER PRE CAINOZOIC IGNEOUS ROCKS (BADU GRANITES)

Woodland/ vine forest. This community occurs on the granite hill-slopes above the coastal plain (Fig. 8). It is mostly a grassy woodland up to 15 metres in height. Canopy trees include *Corymbia clarksoniana, Corymbia tessellaris, Barringtonia calyptrata, Welchiodendron longivalve*, *Acacia* spp., and *Terminalia muelleri*. The groundcover is mainly *Heteropogon triticeus*.

In some places where there is more moisture vine thicket species are more frequent (e.g. *Barringtonia calyptrata, Welchiodendron longivalve, Bombax ceiba*).

The woodland element of this community matches Vegetation Unit 44 (*Corymbia tessellaris, C. clarksoniana* ± *Lophostemon suaveolens* ± *Acacia crassicarpa* open-forest to woodland) and RE 3.12.9. The rainforest element matches Vegetation Unit 22 (Notophyll vine forest of *Welchiodendron longivalve* on Torres Strait Islands) and RE 3.12.4. Both these units are widely recorded on Mua.

DISCUSSION AND CONCLUSION

The landzone/landforms of Gelam's homeland are listed in Table 3 together with their vegetation communities, and their corresponding Neldner & Clarkson (1995) vegetation unit and preliminary regional ecosystem.

The geology units for the area were supported (beach ridge, residual deposits, Badu Granite) but at least in the north-western part of the study area the residual deposits, though dominant, were found to include more recent alluvial sediments.

The vegetation mapping (Neldner & Clarkson, 1995) for the area was generally supported. Their four vegetation units in the vicinity of Gelam's homeland (see Fig. 1) were recognised during the current investigation. However, vegetation unit 18 was found to occur on residual deposits (landzone 5) rather than on alluvium (landzone 3).

An additional three coastal dune vegetation communities were also recognised. These correspond to the following Neldner & Clarkson (1995) vegetation units (and preliminary regional ecosystems):

- 196 Mixed herb species sparse-herbland ± emergent low trees (RE 3.2.25),
- 54 *Acacia crassicarpa* ± *Syzygium suborbiculare* ± *Parinari nonda* ± *Acacia* spp. woodland (RE 3.2.5),
- 122 Evergreen notophyll vine forest dominated by *Manilkara kauki* ± *Mimusops elengi* ± *Terminalia* spp. (RE 3.2.28).

The recognition of these additional communities (54, 122, 196) is related to the recognition of an additional landzone (2. Quaternary coastal sand deposits) and the finer scale of data collection (1:25,000) undertaken here compared with Neldner and Clarkson's 1:100,000 mapping. Vegetation units 54 and 196 have been mapped elsewhere on Mua while unit 122 has been mapped on nearby continental islands but, as yet, not on Mua.

Overall, this work suggests that accurate mapping of regional ecosystems on Mua will require a more detailed assessment of landzones.

ACKNOWLEDGEMENTS

Thanks to Eda Addicott, Mark Newton, Andrew Ford, Bob Jago, Michelle Richards, Bruno David and the people of Mua for their assistance with this project.

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