Soil Indicators of Queensland Wetlands

Melaleuca Citrolens

Chain of pools

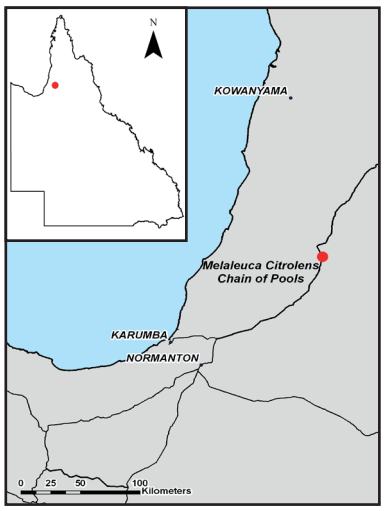
Queensland Wetlands Program

Study Area

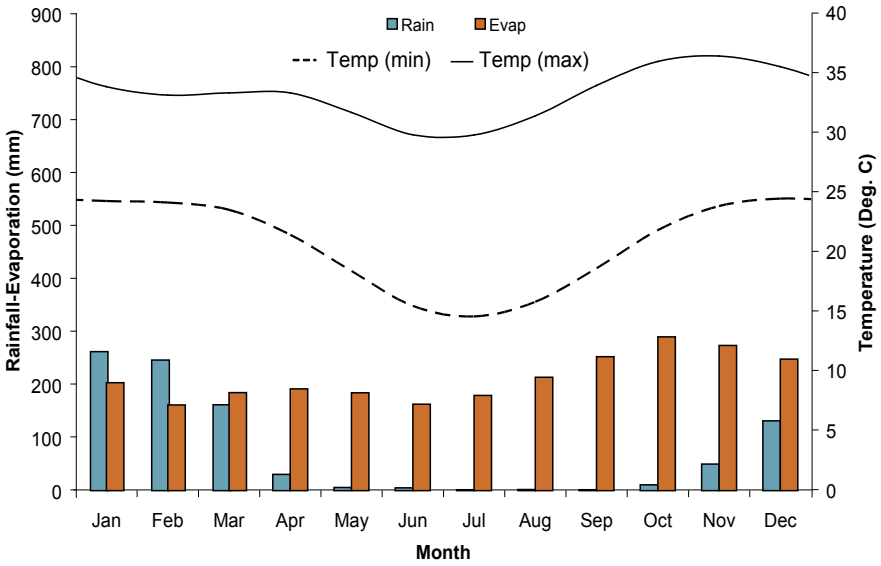
This transect is located approximately 130 km north-east of Normanton along the Burke Development Road, Northern Queensland.

The area is comprised of a string of closed depressional pools that are dominated by *Melaleuca citrolens* which form part of a drainage line.

This study area is an example of a coastal and sub-coastal non-floodplain tree swamp (melaleuca and eucalyptus spp.) in the Gulf Plains Bioregion.



Climate[1]



The study area is situated within a tropical/equatorial climatic region with a distinct wet and dry season. Evaporation exceeds rainfall in the majority of months. The average annual rainfall is 911 mm.

Landform and Inundation	Small closed depressions on extensive level plains Seasonal freshwater inundation from overland flow
Soils[2]	Hydrosols and Dermosols
Vegetation[3]	*Melaleuca citrolens* with or without *Melaleuca foliolosa* low open woodland along drainage lines (RE 3.3.47)
Geology[4]	Wyaaba beds: clayey quartsoze sand, sandstone, granule conglomerate pebbly in places; interbed sandy claystone
Disturbance	No effective disturbance except grazing by hoofed animals

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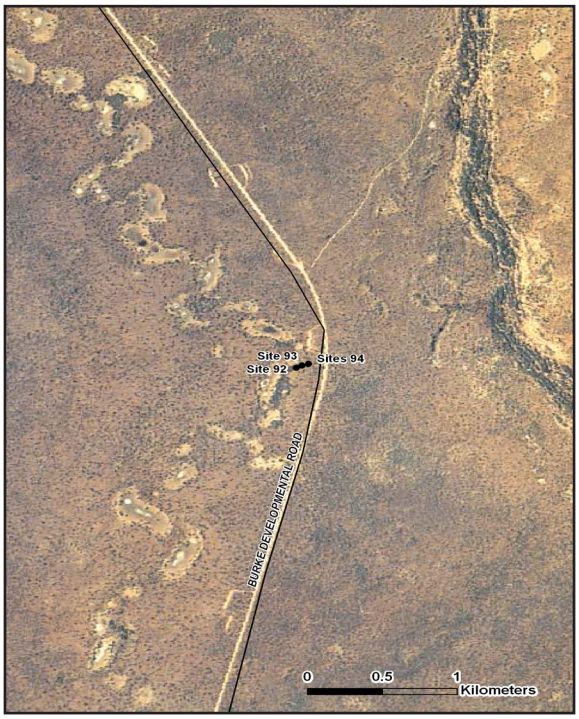
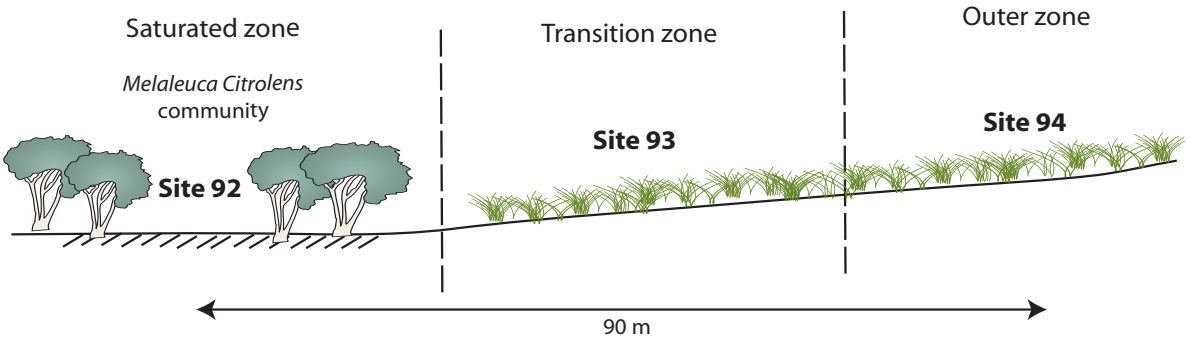
Location

GDA94 • MGA Coordinates : 605282 E, 8144009 N, Zone 54 • Lat/Long : -16.78461 S, 141.98792 E



Landscape Diagram



Summary of Field Observations

- Ferromanganiferous nodules and maganiferous soft segregations indicative of periodic saturation in saturated zone
- Ferruginous root channel linings indicative of a periodically inundated environment
- Mottles present within 0.3 m of soil surface and at depth imply water fluctuation throughout all soil profiles
- Columnar structured B horizons, within the saturated and transition zone, may cause ponding of water in the closed depression
- *Melaleuca citrolens* indicative of intermittent inundation

Soil Indicators Present (within 0.3 m of surface)

Indicator[5]	Site 92	Site 93	Site 94
Organic materials and organic carbon (OC)*	No organic materials OC: 0.62%	No organic materials OC: 0.41%	No organic materials OC: 0.44%
Matrix colour	Yellowish brown	Yellowish brown	Yellowish brown
Chroma (thickness of layer)**	Present (0.05 m)	Present (0.08 m)	Not present
Mottles and Segregations	Few <2 mm ferromanganiferous nodules Common <2 mm manganiferous soft segregations Common 5-15 mm faint brown mottles Few <5 mm faint pale mottles	Very few 2-6 mm ferruginous nodules Common <5 mm faint orange mottles	Common <5 mm faint organge mottles Common <5 mm faint pale mottles
Depth to groundwater	Not present	Not present	Not present
Ferruginous root channel and pore linings	Present	Not present	Present
pH*[6]	Very strongly acid	Strongly acid	Strongly acid
Texture	Loamy sand to sandy light medium clay	Sandy light clay to sandy light medium clay	Fine sandy clay loam to light medium clay
Acid sulfate material	Not present	Not present	Not present
Electrical Conductivity (EC)[6]	Non saline	Non saline	Non saline

**Organic carbon % (Dumas method) and pH taken from surface (0-0.1 m)*
***Chroma value is less than or equal to 2*

Columnar structured soils

Columnar structured soils are characterised by soil particles arranged around a vertical axis and bounded by relatively flat faces with a domed surface[7] (Figure 1).

These soils are often very dense and the columns are not easily penetrated by plant roots, as such they impede drainage and can cause prolonged waterlogging.

a) b)

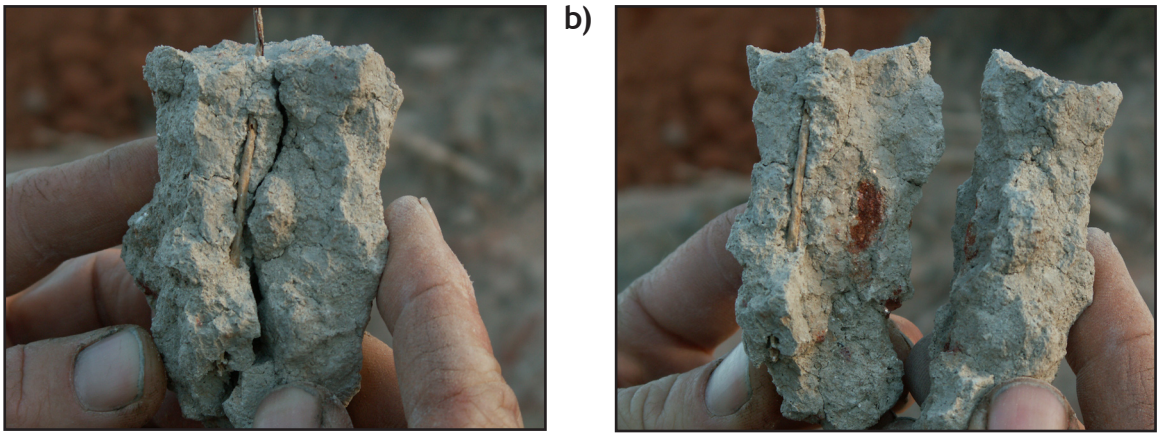


Figure 1. An example of a columnar structured soil a) columns fit together in the soil profile b) individual soil columns.

References

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2. Isbell RF (2002). The Australian Soil Classification. CSIRO Publishing, Collingwood, Victoria, revised edition.

3. EPA (2008) Regional Ecosystems. [online]. Available at http://www.epa.qld.gov.au/nature_conservation/biodiversity/regional_ecosystems/ [accessed 28/06/08].

4. Bureau of Mineral Resources (1972). Galbraith: Australia 1:250,000 Geological Series, Bureau of Mineral Resources, Canberra.

5. Bryant KB, Wilson PR, Biggs AJW, Brough DM and Burgess JW (2008). Soil Indicators of Queensland Wetlands: State-wide assessment and methodology. Queensland Department of Natural Resources and Water. Brisbane.

6. Hazelton P and Murphy B (2007). Interpreting Soil Test Results: What do all the numbers mean?. [2nd ed]. CSIRO publishing. Collingwood Victoria

7. McDonald RC, Isbell RF, Speight JG, Walker J and Hopkins MS (1990). Australian Soil and Land Survey Field handbook, Second edition. Inkata Press, Melbourne.

Soil Chemistry

Site	Depth (m)	pH*	EC (dS/m)	Cl (mg/kg)	NO3-N (mg/kg)	TC%**	TN%**
92	0.00-0.10	4.9	0.03	22	<1	0.62	<0.03
	0.20-0.30	7.4	0.11	84	1	0.29	<0.03
	0.40-0.50	8	0.28	274	<1	0.12	0.46
93	0.00-0.10	5.4	0.02	<20	<1	0.41	0.05
	0.10-0.20	5.9	0.05	48	<1	0.32	0.04
94	0.00-0.10	5.2	0.02	20	<1	0.44	0.03
	0.20-0.30	5.7	0.01	<20	1	0.16	<0.03
	0.40-0.50	6.1	0.04	31	<1	0.2	<0.03

*Aqueous 1:5

**Total carbon and total nitrogen

Soil Morphology

Site 92		Classification		Australian Soil Classification			Bleached-Sodic, Sodosolic, Oxyaquic Hydrosol		
				Landform Element			Swamp		
				Morphological Type			Closed depression		
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
A1	0 to .1	clear to	loamy sand	yellowish brown (10YR54)	none	none	weak 5-10 mm platy	common (10-20%) fine (<2 mm) ferruginous root linings	weak dry
A2e	.1 to .15	abrupt to	loamy sand	yellowish brown (10YR54)	none	none	massive	few (2-10%) fine (<2 mm) ferromanganiferous nodules	very weak dry
B21	.15 to .45	gradual to	fine sandy light medium clay	brown (10YR53)	common (10-20%) medium (5-15 mm) faint brown mottles, few (2-10%) fine (<5 mm) faint pale mottles	none	strong 50-100 mm columnar, moderate 10-20 mm angular blocky	few (2-10%) fine (<2 mm) ferromanganiferous nodules, common (10-20%) fine (<2 mm) manganiferous soft segregations	very strong dry
B22	.45 to .75	gradual to	fine sandy light clay	brown (10YR53)	none	none	weak 5-10 mm angular blocky	few (2-10%) medium (2-6 mm) ferromanganiferous nodules	very firm dry
B2	.75 to 1	-	light medium clay	light brownish grey (10YR62)	few (2-10%) fine (<5 mm) distinct red mottles	none	moderate 10-20 mm angular blocky	common (10-20%) medium (2-6 mm) ferromanganiferous nodules, few (2-10%) fine (<2 mm) ferromanganiferous nodules	very strong dry

Site 93		Classification		Australian Soil Classification			Bleached-Sodic, Eutrophic, Brown Dermosol		
				Landform Element			Plain		
				Morphological Type			Simple slope		
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
A1	0 to .02	-	fine sandy light clay	brown (10YR43)	none	none	weak 2-5 mm platy	none	-
A2e	.02 to .1	-	fine sandy light clay	yellowish brown (10YR54)	common (10-20%) fine (<5 mm) faint orange mottles	none	massive	none	-
B2	.1 to .2	-	fine sandy ligh medium clay	dark yellowish brown (10YR45)	common (10-20%) medium (5-15 mm) faint pale mottles	none	strong 20-50 mm columnar	very few (<2%) medium (2-6 mm) ferruginous nodules	-

Site 94		Classification		Australian Soil Classification			Mottled-sodic, Mesotrophic, Brown Dermosol		
				Landform Element			Plain		
				Morphological Type			Flat		
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
A1	0 to .03	abrupt to	fine sandy clay loam	yellowish brown (10YR54)	common (10-20%) fine (<5 mm) faint orange mottles	none	weak 10-20 mm platy	few (2-10%) fine (<2 mm) ferruginous root linings	firm dry
B1	.03 to .2	gradual to	light clay	light yellowish brown (10YR64)	common (10-20%) fine (<5 mm) faint orange mottles, common (10-20%) fine (<5 mm) faint pale mottles	none	moderate 5-10 mm angular blocky	none	strong dry
B21	.2 to .4	gradual to	light medium clay	brownish yellow (10YR66)	few (2-10%) fine (<5 mm) faint orange mottles, few (2-10%) fine (<5 mm) faint pale mottles	none	moderate 10-20 mm angular blocky	none	very strong dry
B22	.4 to .6		light medium clay	light yellowish brown (10YR64)	none	none	strong 20-50 mm angular blocky, strong 10-20 mm angular blocky	few (2-10%) medium (2-6 mm) ferromanganiferous nodules	rigid dry

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