Soil Indicators of Queensland Wetlands

Carbrook Wetlands

Queensland Wetlands Program

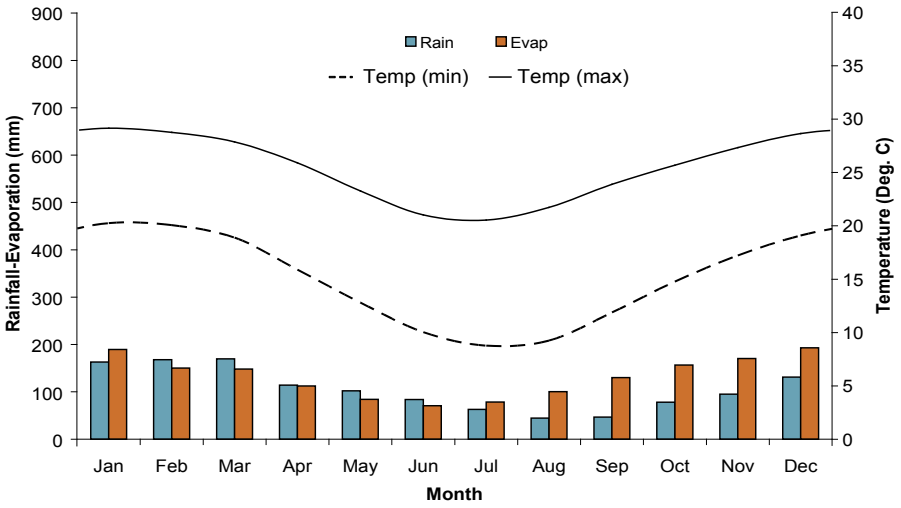
Study Area

Carbrook Conservation Park is located approximately 35 km south-east of Brisbane, South-East Queensland.

The park covers 103 ha of *Melaleuca quuinquinervia* (Paper Bark Teatree), *Casuarina glauca* (Swamp Oak) and mixed Eucalypt forest which runs along tidally influenced Native Dog Creek[1].

This study area is a typical example of a coastal and sub-coastal floodplain tree swamp (melaleuca and euclyptus spp.) in the South-East Queensland Bioregion.

Climate[2]



The study area is situated within a subtropical climatic region with a wet and dry season. Evaporation exceeds rainfall in the majority of months. The average annual rainfall for the area is 1257 mm.

Landform and Inundation	Swamp next to creek and river floodplains Freshwater seasonal inundation from overland flow Some tidal influence on extremely high tides
Soils[3]	Hydrosols
Vegetation[4]	*Melaleuca quinquenervia* open forest on coastal alluvium (RE 12.3.5)
Geology[5]	Estuarine, floodplain and tidal delta deposits
Disturbance	No effective disturbance

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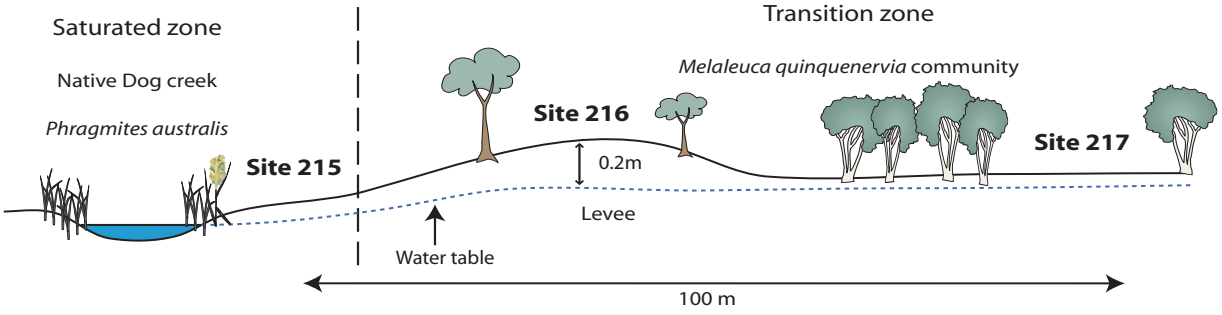
Location

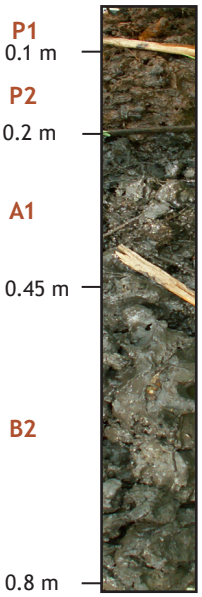
GDA94 • MGA Coordinates : 526726 E, 6937382 N, Zone 56 • Lat/Long : -27.68752 S, 153.27104 E

Landscape Diagram



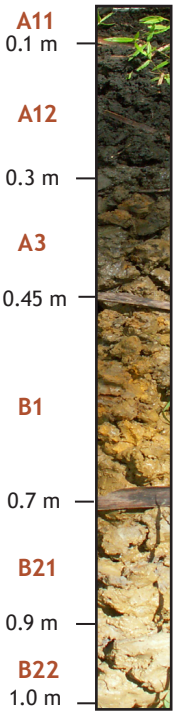
Soil Profiles

Site 215



Organic materials, high organic carbon content, dark soil colours, high water table and presence of sulfidic materials are all positive indicators of a saturated or reduced environment

Site 216



Organic materials, high organic carbon content, dark soil colours, high water table and ferruginous root channel linings are all indicators of a saturated or reduced environment

Brighter sub-surface colours reflect elevated drainage and comparatively less inundation

Site 217

Organic materials, high organic carbon content, dark soil colours, high water table and mottling are all indicators of a saturated or reduced environment

Soil Indicators Present (within 0.3 m of surface)

Indicator[6]	Site 215	Site 216	Site 217
Organic materials and organic carbon (OC)*	Organic materials to 0.3 m OC%: 28.2	Organic materials to 0.1 m OC%: 16.3	Organic materials to 0.3 m OC%: 19.2
Matrix colour	Dark brown to black	Black	Black
Chroma (thickness of layer)**	Present (0.2 m)	Present (0.3 m)	Present (0.3 m)
Mottles and Segregations	Not present	Not present	Few <5 mm distinct dark mottles
Depth to groundwater	0.02 m	0.2 m	0.05 m
Ferruginous root channel and pore linings	Not present	Present	Not present
pH*[7]	Very strongly acid	Very strongly acid	Very strongly acid
Texture	Loam to light clay	Loam to light clay	Loam
Acid sulfate material	Present	Not present	Not present
Electrical Conductivity (EC)[7]	Moderately saline	Non saline	Moderately saline

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

Summary of Field Observations

- Presence of swamp hummock microrelief denotes a saturated environment
- Dark soil surface colours and greyish colours at depth are positive indicators of saturated conditions
- High organic carbon levels and organic material within the surface 0.3 m indicate saturated conditions at all sites
- Thickness of the organic material layer in the surface 0.3 m at site 216 is smaller than at the other sites, this is due to the site being located higher in the landscape (on a levee) and therefore not inundated as long as the other sites
- Poor external drainage predisposes the area to saturated conditions
- Hydrogen sulfide gas detected in the saturated zone and presence of iron staining of the surrounding environment indicates a reduced environment and the presence of sulfidic materials.
- Faint and distinct mottling signifies water fluctuation throughout all profiles

References

1. QPWS (1999) Carbrook Wetlands Conservation Park: Management Plan. Queensland Parks and Wildlife Service. Brisbane

2. Queensland Department of Natural Resources and Water (2008). SILO [online]. Available at http://www.longpaddock.qld.gov.au/silo/ [accessed 5/11/2007].

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

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

5. Bureau of Mineral Resources (1978). Moreton: Australia 1:250,000 Geological Series, Bureau of Mineral Resources, Canberra.

6. 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.

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

Soil Morphology

Site 215		Classification		Australian Soil Classification			Sulfuric Extratidal Hydrosol		
				Landform Element			Swamp		
				Morphological Type			Flat		
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
P1	0 to .1	-	fibric loam	brownish black (10YR32)	none	none	moderate angular blocky	none	very weak wet
P2	.1 to .2	-	sapric loam	dark brown (10YR33)	none	none	moderate angular blocky	none	very weak wet
A1	.2 to .45	-	sapric light clay	black (5Y21)	none	none	moderate angular blocky	none	weak wet
B2	.45 to .8	-	medium clay	brownish black (2.5Y31)	very few (<2%) fine (<5 mm) faint yellow mottles	none	massive	none	firm wet

Site 216		Classification		Australian Soil Classification			Sulfuric Extratidal Hydrosol		
				Landform Element			Levee		
				Morphological Type			Flat		
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
P2	0 to .1	clear to	sapric loam	black (5Y21)	none	none	moderate granular	very few (<2%) fine (<2 mm) ferruginous root linings	weak moist
A1	.1 to .3	gradual to	light clay	black (5Y21)	none	none	moderate subangular blocky	none	weak moist
A3	.3 to .45	gradual to	heavy light clay	olive black (5Y22)	few (2-10%) fine (<5 mm) faint yellow mottles	none	moderate subangular blocky	none	firm wet
B1	.45 to .7	gradual to	light medium clay	yellowish grey (2.5Y41)	common (10-20%) medium (5-15 mm) prominent yellow mottles	none	massive	none	firm wet

Site 217		Classification		Australian Soil Classification			Sulfidic, Extratidal Hydrosol		
				Landform Element			Swamp		
				Morphological Type			Flat		
Horizon	Depth (m)	Boundary	Texture	Colour	Mottles	Coarse Fragments	Structure	Segregations	Consistence
P1	0 to .1	-	fibric loam	black (5Y21)	few (2-10%) fine (<5 mm) distinct dark mottles	none	-	none	very weak moist
P2	.1 to .3	-	sapric loam	black (2.5Y21)	none	none	moderate subangular blocky	none	weak wet
A1	.3 to .5	-	light medium clay	brownish black (2.5Y31)	very few (<2%) fine (<5 mm) faint brown mottles	none	massive	none	firm wet
B21	.5 to .8	-	medium clay	grey (2.5Y51)	few (2-10%) medium (5-15 mm) prominent yellow mottles, very few (<2%) medium (5-15 mm) distinct brown mottles	none	massive	none	firm wet
B22	.8 to 1	-	medium clay	grey (5Y41)	very few (<2%) medium (5-15mm) distinct brown mottles	none	massive	none	firm wet

Soil Chemistry

Site	Depth (m)	pH*	EC (dS/m)	Cl (mg/kg)	NO3-N (mg/kg)	TC%**	TN%**
215	0.00-0.10	5	1.56	4100	<1	28.2	1.23
	0.20-0.30	5.6	4.08	6080	<1	7.22	0.37
	0.40-0.50	6.4	4.94	7100	<1	3.15	0.17
216	0.00-0.10	4.8	0.41	540	<1	16.3	0.88
	0.20-0.30	4.5	0.53	627	<1	5.31	0.34
	0.40-0.50	4.3	0.93	1240	<1	3.05	0.18
217	0.00-0.10	4.4	2.07	4540	<1	19.2	0.89
	0.20-0.30	4.1	2.13	2850	<1	4.01	0.25
	0.40-0.50	4.1	2.06	2850	<1	1.67	0.11

*Aqueous 1:5
**Total carbon and total nitrogen

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