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Groundwater dependent ecosystem pictorial conceptual model ‘coastal sand masses (high dunes)’

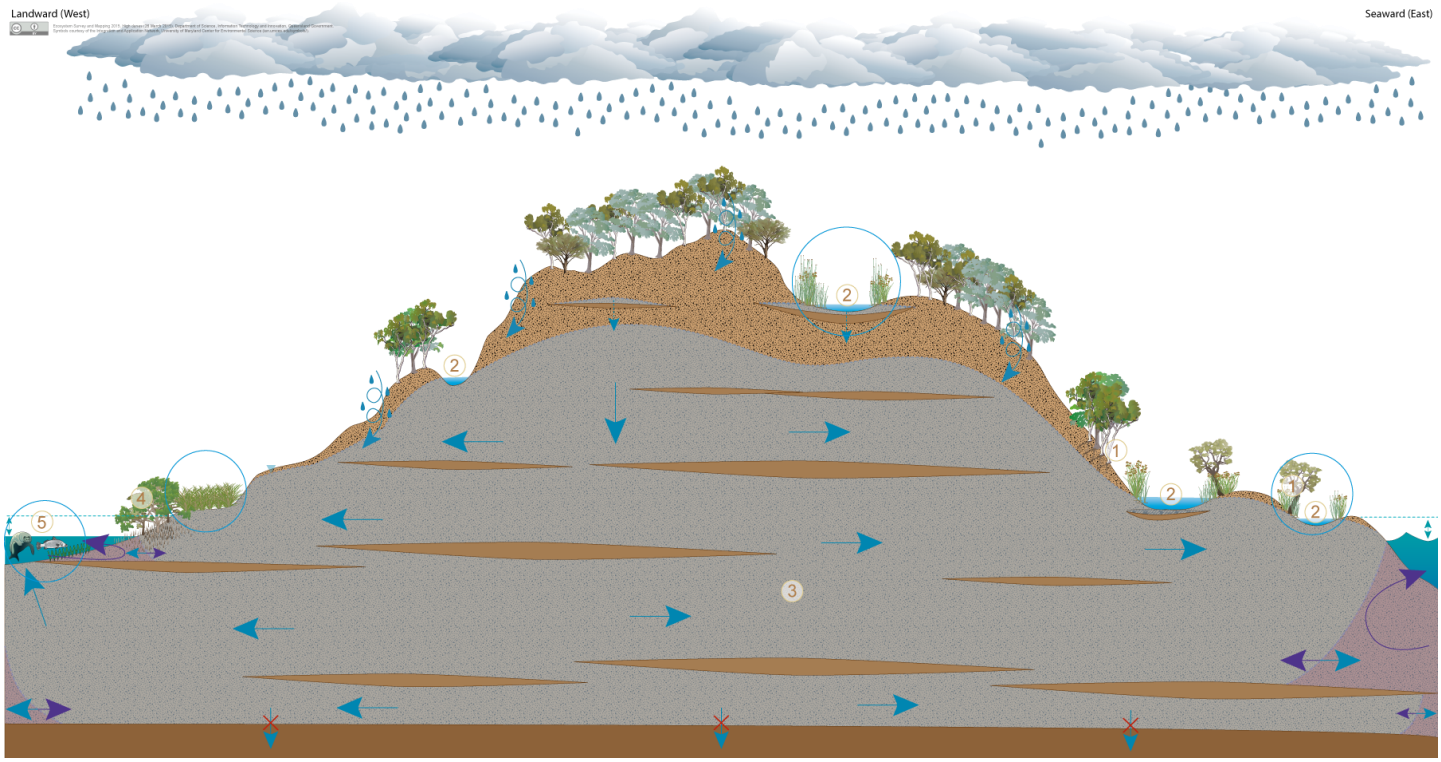
Version 1.5

Coastal sand masses (high dunes)

Coastal sand islands with high dunes usually contain one or more unconfined, unconsolidated sedimentary aquifers, where groundwater is stored and transmitted through inter-granular voids between sand particles. These unconsolidated sedimentary aquifers may be perched due to the presence of low permeability layers within the coastal sand mass (e.g. layers of coffee rock or beach rock). Examples of coastal sand islands with high dunes along the Queensland coast include Fraser, Moreton and North Stradbroke islands.

A wide range of ecosystems may depend on groundwater in these unconsolidated sedimentary aquifers to support their plant and animal communities, ecological processes and delivery of ecosystem services.

- Palustrine (e.g. swamps) and lacustrine (e.g. lakes) wetlands and riverine (e.g. streams and rivers) water bodies on coastal sand masses may depend on the surface expression of groundwater from these unconsolidated sedimentary aquifers. In general, the regional aquifer sustains stream flow in lower parts of the landscape and perched aquifers may supplement streams higher in the landscape.
- Terrestrial vegetation on coastal sand masses, usually in lower parts of the landscape or at low altitudes, may depend on the sub-surface presence of groundwater in these sand mass aquifers where groundwater is typically accessed through the capillary zone above the water table.
- Unconsolidated sedimentary aquifers may also support subterranean ecosystems within the aquifer itself, which sometimes is indicated by the presence of stygofauna.
- Estuarine and near-shore marine ecosystems located adjacent to coastal sand masses may depend on the discharge of groundwater from these unconsolidated sedimentary aquifers.



Geology legend

Sand

Peat

Low permeability rock
Indurated sand layers (e.g. humic beach rock or coffee rock) with highly variable extent and thickness

Basement of the model

Groundwater hydrology legend

Sand (unsaturated)

Sand (saturated with marine water)

Sand (saturated with groundwater)

Peat (saturated)

Low permeability rock (unsaturated)

Basement of the model (unsaturated)

Infiltration and percolation
Rain infiltrates through the soil to recharge the aquifer below

Groundwater table

Direction of groundwater movement

Negligible groundwater movement

Groundwater leakage

Direction of marine water movement

Groundwater and marine water interface
The position of the interface will vary temporally

Tidal range

Flora legend

Acacia spp.

Cladium spp.

Corymbia spp.

Eleocharis spp.

Eucalyptus spp.

Melaleuca spp.

Mangrove

Patterned fens

Seagrass

Evapotranspiration
Process whereby plants drew water up through their roots and move it out through their leaf pores

Fauna legend

Dugong dugon

Fish

Focal elements legend

Marine GDEs dependent on submarine groundwater discharge
Low permeability layers of indurated sand may extend from the high dunes into the seabed and may facilitate groundwater discharge.

Surface GDEs dependent on perched groundwater
Low permeability layers of indurated sand within high dunes may perch groundwater in the unsaturated zone resulting in GDEs higher in the landscape.

Patterned fens
Patterned fens are characterised by parallel ridges of fens perpendicular to the down-slope direction of groundwater movement. These ridges may be separated by low permeability layers (e.g. indurated sand).

Intermittently closed and open lakes and lagoons (ICOLLs)
ICOLLs are typically separated from the ocean by a sand beach barrier or berm. This barrier can break down intermittently, allowing periods of increased connectivity to the marine environment.

Groundwater dependent ecosystem legend

Terrestrial GDEs
Regional ecosystems and riverine wetlands may depend on the subsurface presence of groundwater within the capillary zone for some or all of their water requirements.

Surface expression GDEs
Lacustrine wetlands, palustrine wetlands and riverine water bodies may depend on the surface expression of groundwater for some or all of their water requirements.

Subterranean GDEs
Aquifer and cave subterranean wetlands may depend on the subterranean presence or expression of groundwater for some or all of their water requirements.

Surface expression GDEs (estuarine systems)
Estuarine wetlands may depend on the surface expression of groundwater for some or all of their water requirements. This sub-type of GDE is not currently mapped in the Queensland GDE mapping.

Surface expression GDEs (near-shore marine systems)
Near-shore marine wetlands may depend on the surface expression of groundwater for some or all of their water requirements. This sub-type of GDE is not currently mapped in the Queensland GDE Mapping.

Citation

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