Couran Cove Island Resort

Mangrove Environment of Couran Cove Island Resort

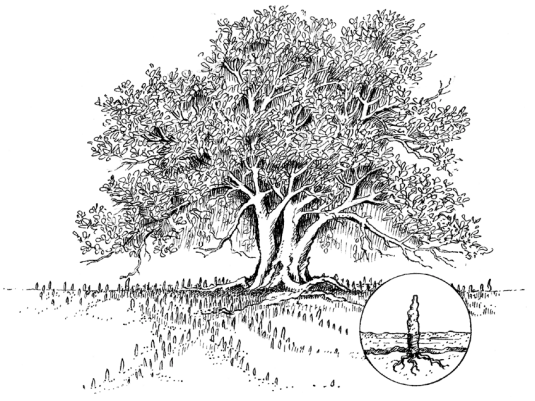
Mangroves are flowering terrestrial plants that have established themselves at fringes of protected salt water bodies (i.e. bays, inlets, estuaries). It's reported that 60-75% of the coastline of the earth's tropical region is lined with mangroves – so their importance is clear. On South Stradbroke Island, we are fortunate to have 6 different Mangrove species, which include:

- Grey Mangrove (*Avicennia marina*)
- River Mangrove (*Aegiceras corniculatum*)
- Milky Mangrove (*Excoecaria agallocha*)
- Yellow Mangrove (*Ceriops tagal* var. *australis*)
- Orange Mangrove (*Bruguiera gymnorhiza*)
- Stilted Mangrove (*Rhizophora stylosa*).

Mangroves have developed remarkable characteristics and adaptations for survival in the marine/terrestrial fringe where the soil is relatively anoxic (lacking oxygen). They are continuously inundated and submerged in salt water with the rising tide and where wind action can sometimes be intense. The adaptations against these, often harsh, environments include the following:

Roots Systems

With the soil in mangrove communities being anoxic, the root systems of mangroves take on many different forms. All mangroves have stabilisation (anchor) roots that extend deep into the soil, but the main root system is quite shallow. These shallow roots often send up extensions called *pneumatophores*, which allow direct oxygen uptake from the atmosphere. The Grey Mangrove (*Avicennia marina*), which is one of the dominant mangrove species found on South Stradbroke Island, exhibit these.



Pneumatophores

Other mangrove species such as *Bruguiera* species exhibit knee roots, which are loops in cables appearing like knobbly knees above the mud. Finally, some *Rhizophora* and *Avicennia* species exhibit aerial roots. These roots actually descend from the branches but do not penetrate the soil. There is quite a substantial amount of biomass contained in mangrove root systems, so much so in fact that there is greater biomass underground than above ground. This greatly reduces the chances of being washed away or damaged during storms. Other mangrove species on South Stradbroke Island such as the Yellow Mangrove (*Ceriops tagal*) have buttress roots, which are similar to many rainforest plants. Additionally, the Stilted Mangrove (*Rhizophora stylosa*) posses very extensive stilted roots.

Salinity

Mangroves have developed remarkable adaptations to deal with and tolerate salt. The three main adaptations exhibited by mangroves are exclusion, excretion and accumulation. Mangrove species such as the River Mangrove (*Aegiceras corniculatum),* often found growing along with the Grey Mangrove, excretes salt through special glands on the upper surface of its leaves. Other mangroves, like the Grey Mangrove accumulate salt in specially selected leaves, whereby these leaves are shed once salt concentrations get too high. Mangrove species that exclude salt include species within the genera of *Avicennia, Ceriops, Rhizophora, Bruguiera and Excoecaria*, all of which are found on South Stradbroke Island. Excluders possess a sort of super filter which enables them to take up water whilst filtering most of the salt out.

Reproduction

Nearly all mangrove species share two reproductive strategies, that is vivipary and dispersal by water. Vivipary is when the seed, while still on the parent plant, germinates and begins to grow into a seedling. During this growth period the seedling becomes elongated and the distribution of its weight changes (making it heavier at the outside free end).

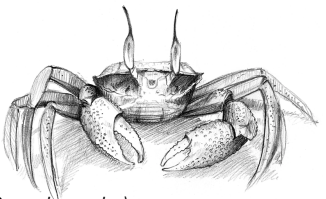
Viviparous fruit still on parent tree

Eventually this seedling is dropped from the parent plant and floats upright (due to its weight distribution) in water. Water currents then carry the upright seedling into shallower water where its root end strikes the bottom. It then sends out an anchor root to stabilise itself in the mud and continues its growth into a mature tree.

Although mangroves produce large amounts of seed per year, only a few successfully take root. Most of them are washed up as debris with other flotsam mud banks that are exposed as low tide recedes. This provides the ideal environment for *Avicennia* and *Rhizophora* pioneer species to get a foothold. It is under these circumstances that new mangrove forests are formed. Although nearly all mangrove species utilise vivpary, there is one particular species, commonly called the Cannonball Mangrove (*Xylocarpus granatum*), that produces large round fruit that literally explodes open when ripe, scattering the seeds. However, this species is not found on South Stradbroke Island.

Mangroves as a Vital Habitat

Due to the location of mangroves, they are significant to both marine and terrestrial organisms.
The dominant marine organisms that inhabit mangrove communities are molluscs, crustaceans and fish. Mollusc species found in these environments include snails and bivalves (such as oysters). Mangroves are also home to a large number of crabs and shrimps. These animals excavate burrows in the soft substrate. These burrows serve several functions; as a refuge from predators; as a breeding place; and as an aid to feeding. They also serve an important function to the mangroves themselves by allowing oxygen to penetrate more deeply into the anoxic mud.



Ghost crab (Ocypode species)

Mangroves also serve as nursery grounds for penaeid shrimp and fish species , which spend the early part of their lifecycles in these areas before moving offshore. It is estimated that over 80% of commercial Australian fish species utilise mangrove communities as nursery grounds – adding to their vital significance. There is an enormous range of birds, both sedentary and migratory, that rely on mangrove areas. Many terrestrial animals also rely on mangrove communities as a source of food and shelter. For example, at Couran Cove Island Resort, wallabies feed on the fruits of the mangroves and many bird species, such as Whistling Kites, Kingfishers and Honeyeaters, use mangroves as a source of shelter, protection and food supply.

Like all environments, photosynthesis is the basis for the mangrove food chain. It is this process that develops plant tissues, which are the primary food source. However, it is not the mangroves that directly provide this food, it is the leaf litter dropped by the mangroves along with other organic matter washed down from adjacent terrestrial environments. Approximately 80% of this leaf litter then decomposes forming small particles called *detritus,* which is a direct food source for crabs and prawns (Claridge & Burnett 1993).

Conservation & Protection of Mangroves

With mangrove communities playing such a vital role as habitat for many associated organisms and their function as an effective buffer between the land and sea, the need for conservation and protection is extremely high. So significant is their existence that all mangrove species are now protected in Queensland under section 123 of the *Fisheries Act.*

Mangroves enjoy relatively stable, predictable conditions – minimal water movement, steady sedimentation rate, regular tidal regime, as well as water and soil of a certain salinity. Any change, be it human or natural, can upset this balance, resulting in mortality. Human impact includes filling, removal for timber and dredged sand, from nearby water ways, being placed upon them. Natural impact can include storms. It is, however, crucial that humans recognise the importance that mangrove communities have for them. They are a habitat to a diverse range of animals and more importantly, they stabilise land in the face of storms. They also play an important role in sediment accumulation, runoff reduction and decreased erosion from adjacent terrestrial environments.

Economic Significance of Mangroves Fisheries

During 1987 and 1988, a study was carried out on Moreton Bay which found that a total of 94% of the organisms studied were of direct importance to the regional fisheries (Claridge & Burnett 1993).
This means that the marketable value of fish from mangroves is equivalent to $8300 per hectare per year (Claridge & Burnett 1993).

Another study, conducted by Maryborough High School throughout 1991 and 1992 in an estuary called Germen Creek, found that of the 26 species taken, 18 were of commercial or recreational fishing importance. Many of the commercially viable prawn species spend part of, or their entire, life within mangroves and estuaries.

Shore Protection

Mangrove environments are excellent buffers in the face of storms, significantly reducing storm damage, and therefore reducing the costs of repairing and rebuilding damaged coastal townships. Apparently, when Cyclone Tracey hit Darwin in 1974, two yachts took shelter in a mangrove creek – it turned out that these were the only two boats to survive the cyclone unscathed!

Recreation

The recreational value of mangroves and estuaries is difficult to quantify. However, in 1990, a survey was conducted by the Centre for Coastal Management which indicated that just under 50% of Brisbane residents had visited wetlands within that year for recreational pastimes such as, fishing, boating, wildlife observation, swimming, photography etc.

Bee Keeping

Beekeepers regard mangrove communities as a major source of the honey produced by their bees. Of particular importance is the River Mangrove (*Aegiceras corniculatum*).

References

- Claridge & Burnett 1993

Botanical Illustrations by Louise Sanders©

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