

## Littoral rainforest: Understanding the distribution and resilience of frontline coastal forests

### Summary

Littoral rainforests and coastal vine thickets of Eastern Australia are critically endangered ecological communities. This unique vegetation exists within the dynamic fringe of the coastal zone: they face landward pressure from human settlement and land use but also seaward pressure from extreme weather events and sea-level rise. A detailed study in the Wet/Dry Tropics of Far North Queensland is refining our knowledge of the region's littoral rainforests, their distribution, vulnerability and resilience. One project incorporates the potential forces of sea-level rise and storm surge on the distribution and persistence of this key natural asset which will help to guide its management into the future.

Littoral rainforests are situated in the coastal zone and are defined by the regular actions of sea (salt spray, coastal winds, tides and sediments) as well as extreme weather events (cyclones and storm surge). They play an important ecological role (habitat for endangered species) and deliver significant ecosystem services (protecting foreshores, human settlement and infrastructure). As such, they are an important ecological resource as well as an essential element of the tropical lifestyle and tourism values which attract so many to the shores of the Far North Queensland region (see Figures 1 and 2).



Figure 1: Littoral Rainforest on High Island National Park. © Andrew Ford, CSIRO.

### Keywords

Littoral rainforest, extreme weather, mapping, coastal eco-systems



*Figure 2: Littoral Rainforest on Russell Island National Park. © Andrew Ford, CSIRO.*

Littoral rainforests in the Wet/Dry Tropics are subject to a diverse range of pressures from both human and natural causes; their conservation is hampered by being poorly defined in existing regulatory mapping. In the Wet Tropics bioregion, littoral rainforests are very susceptible to severe storms and intense cyclones. Littoral rainforests and coastal vine thickets of eastern Australia are classed as an endangered ecological community under the Environmental Protection and Biodiversity Act.

The project is unique in that it combines spatial and modelling elements typical of coastal planning (LiDAR-derived inundation levels based on Annual Recurrence Intervals) with on-ground vegetation survey and predictive mapping to define the current and future extent of an ecological community. Fundamentally it also provides management guidance by categorising current and future vulnerability to disruptive/destructive coastal processes and making management recommendations on how to best conserve the community as a whole into the future.

Littoral rainforest is adapted to, and may even benefit from, low-level inundation. However climate change scenarios predict more intense storm events and an increasing magnitude or frequency of storm surge which will have a range of impacts on the ecosystem services it provides. The project defines refugial, buffer and leading-edge functions of littoral rainforest based on the frequency and magnitude of inundation and recommends a range of management actions to improve the resilience of the littoral rainforest.

Refugial vegetation is critical for enhancing the long-term persistence of the littoral rainforest. It is infrequently inundated even under fairly extreme conditions. The project recommends refugial patches should be prioritised for inclusion in the Protected Areas Estate and restored and expanded where they have become fragmented or degraded.

Buffer vegetation is inundated moderately frequently and plays a vital role in protecting refugial vegetation from the effects of storm surge and, in some areas, buffer vegetation plays a very important role in ensuring connectivity between refugial and leading-edge vegetation. Managing pressures and restoring degraded areas should be a priority in order to enhance resilience of the leading-edge vegetation (e.g. by acting as a seed source of native species for regeneration) and in ensuring the continuity of some ecosystem services following frequent but low-level storm surge.

Leading-edge vegetation is exposed to inundation frequently. It can be critical in protecting and buffering human communities from the effects of storm-surge, sea-level rise and other impacts of extreme storm events. Managing existing pressures in these areas will improve the capacity of the vegetation to recover following disturbance.

Littoral rainforests occur in a very dynamic natural landscape in one of the most contested spaces in Australia – the coastal zone. The project highlights that planning and management that reduces current pressures and maximises the flexibility of the system to adapt by shifting and maintaining its size and connectivity is likely to best provide adaptation services through major climate change and extreme events.

## Further reading

Murphy, H.T., A. Ford, E. Graham, D. Metcalfe, 2016: Mapping to underpin recovery planning for Littoral Rainforest and Coastal Vine Thickets in the Wet Tropics. Final Report, 56 pp. CSIRO, Cairns. Accessed 8 June 2017. Available at: [www.nespnorthern.edu.au/wp-content/uploads/2017/02/Mapping-to-underpin-management-of-tropical-littoral\\_rainforest\\_Report\\_Feb2017\\_WEB.pdf](http://www.nespnorthern.edu.au/wp-content/uploads/2017/02/Mapping-to-underpin-management-of-tropical-littoral_rainforest_Report_Feb2017_WEB.pdf).

The full report 'Mapping to underpin recovery planning for Littoral Rainforest and Coastal Vine Thickets in the Wet Tropics' is available from: <http://www.nespnorthern.edu.au/2017/03/01/mapping-help-manage-tropical-littoral-rainforest/>.

The spatial layers produced by the project are available at the CSIRO Data Portal (search for Littoral rainforest): <https://data.csiro.au>.

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