Mapping to underpin management of Littoral rainforest

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National Environmental Science Programme

Why did we do this project?

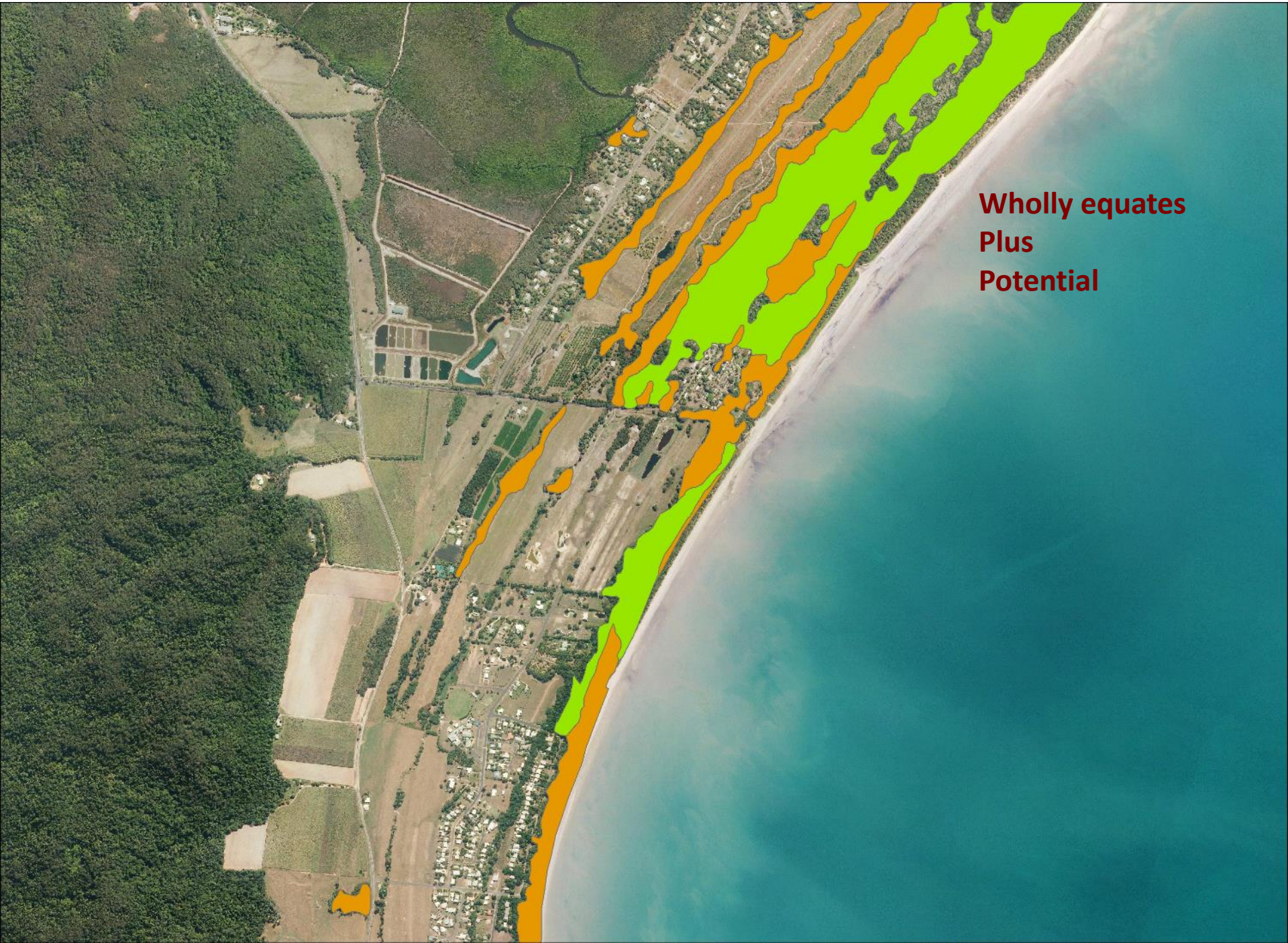
- NESP Research Priority – Develop management practices for rainforests which minimise the impact of extreme weather events
- Littoral Rainforest and Coastal Vine Thickets of Eastern Australia
  - EPBC listed critically endangered ecological community
  - Recovery planning in progress

How did we do it?

- Expert Advisory Committee
- Mapping of LRF
  - Based on a methodology established in previous NERP project at Mission Beach
  - Listing advice criteria e.g. ‘wholly compliant’ RE’s, floristic composition and other characteristics, geology
  - Ground-truthing – 156 site assessments

All spatial data and report - CSIRO Data Portal – search ‘Littoral’


Wholly equates


Wholly equates
Plus
Potential

Establishing a baseline

Of 101 on-ground site assessments where LRF occurrence was confirmed:

- 65% of sites were not in wholly-equate Regional Ecosystems, and
- a further 11% of sites were in areas not covered by any Regional Ecosystem mapping (primarily on islands of the Great Barrier Reef).

Thus, more than 75% of sites where Littoral Rainforest occurs would not have been captured by simply mapping Regional Ecosystems that wholly-equate with the Listing Advice.

The current extent of LRF is probably greater than the existing baseline suggests

Modelling storm-surge, inundation and sea-level rise

- DSITIA report on Average Recurrence Intervals (ARI) for each coastal Qld LGA (June 2014)
- Using high-res coastal LiDAR
- 20 yr, 50, 100, 200, 500, 1000, 10K ARI and TMST with and without an 80 cm sea-level rise

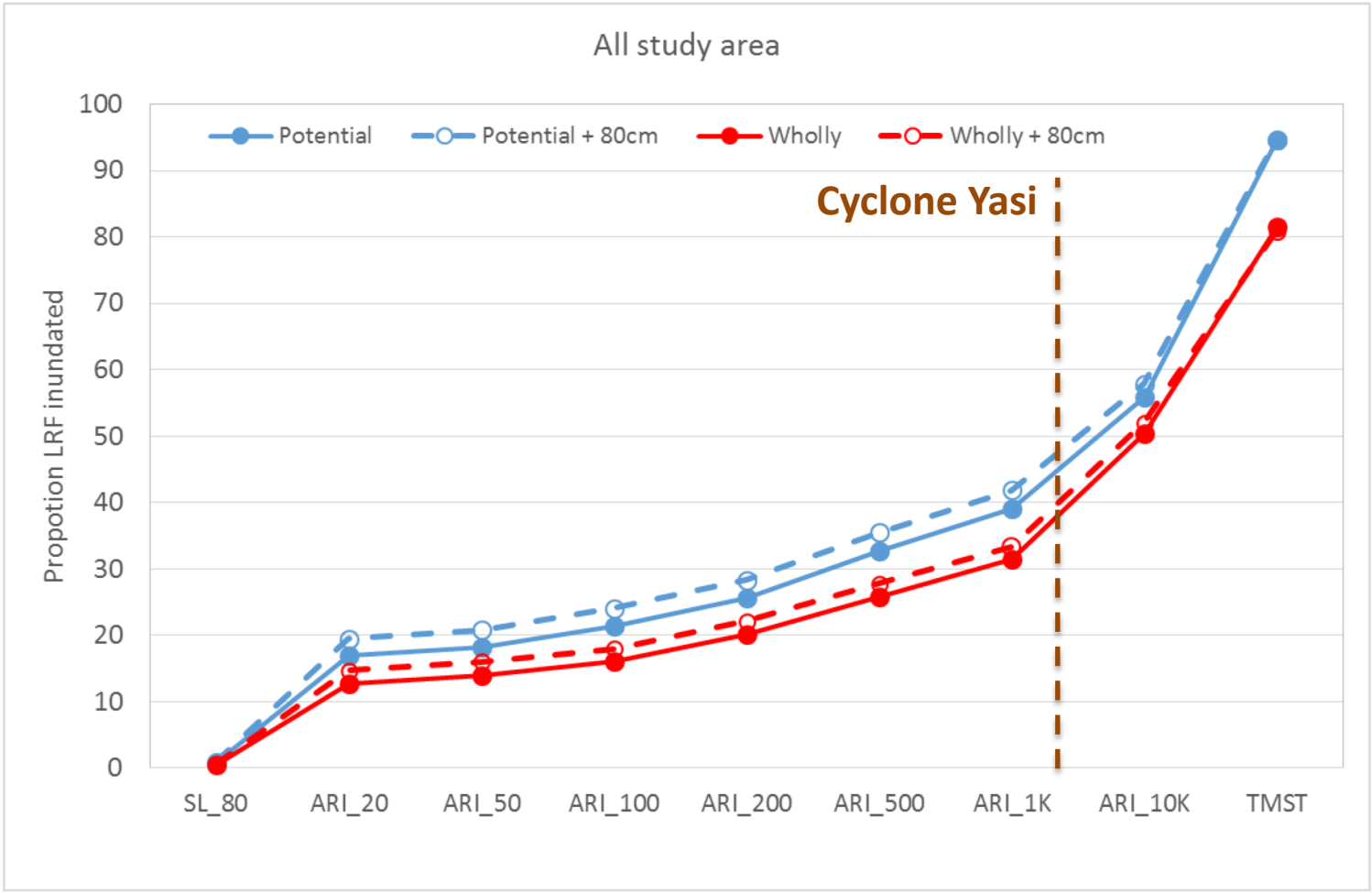

50 Yr
Inundation
< 20%
20 - 50%
> 50%

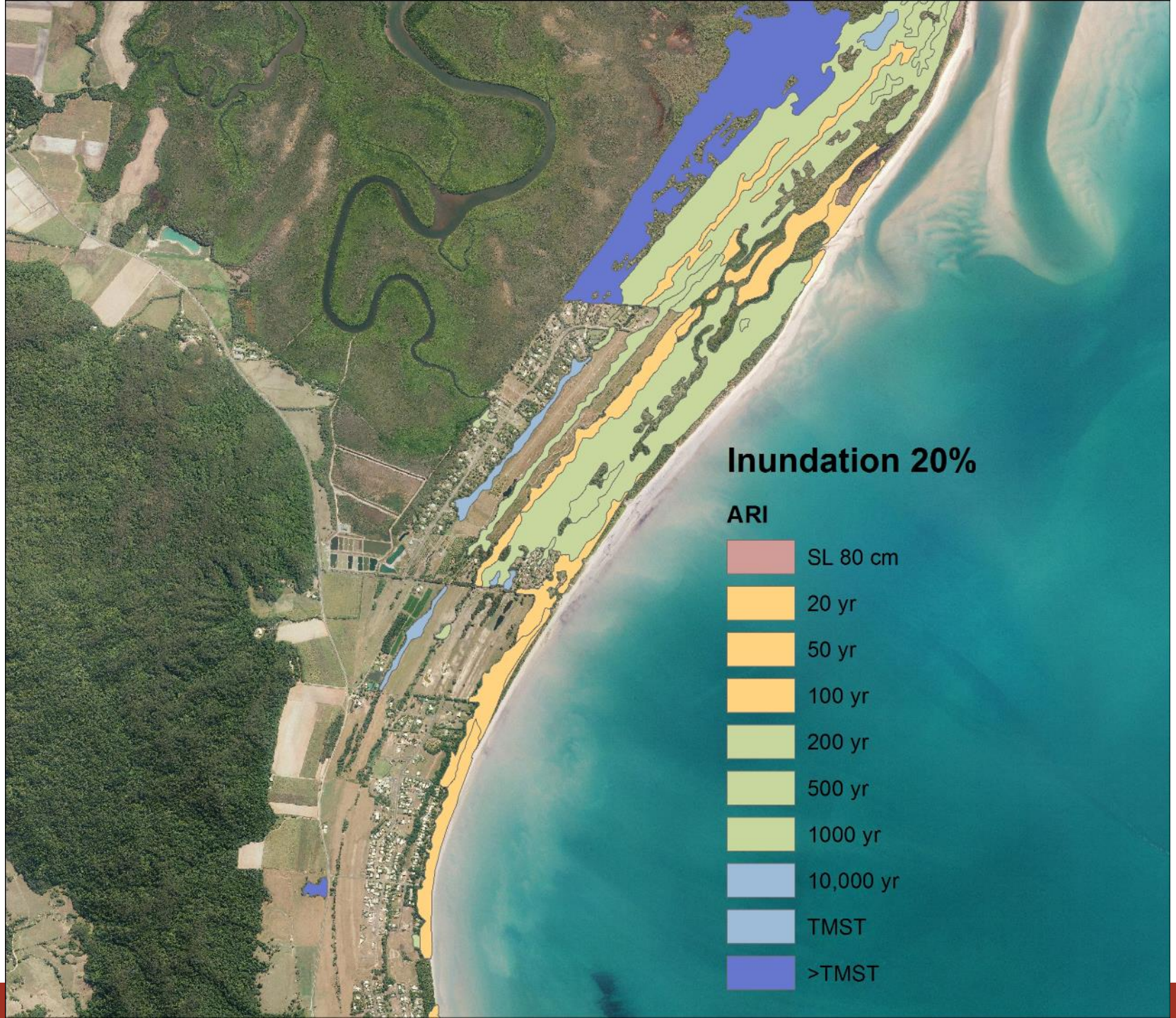

200 Yr
Inundation
< 20%
20 - 50%
> 50%

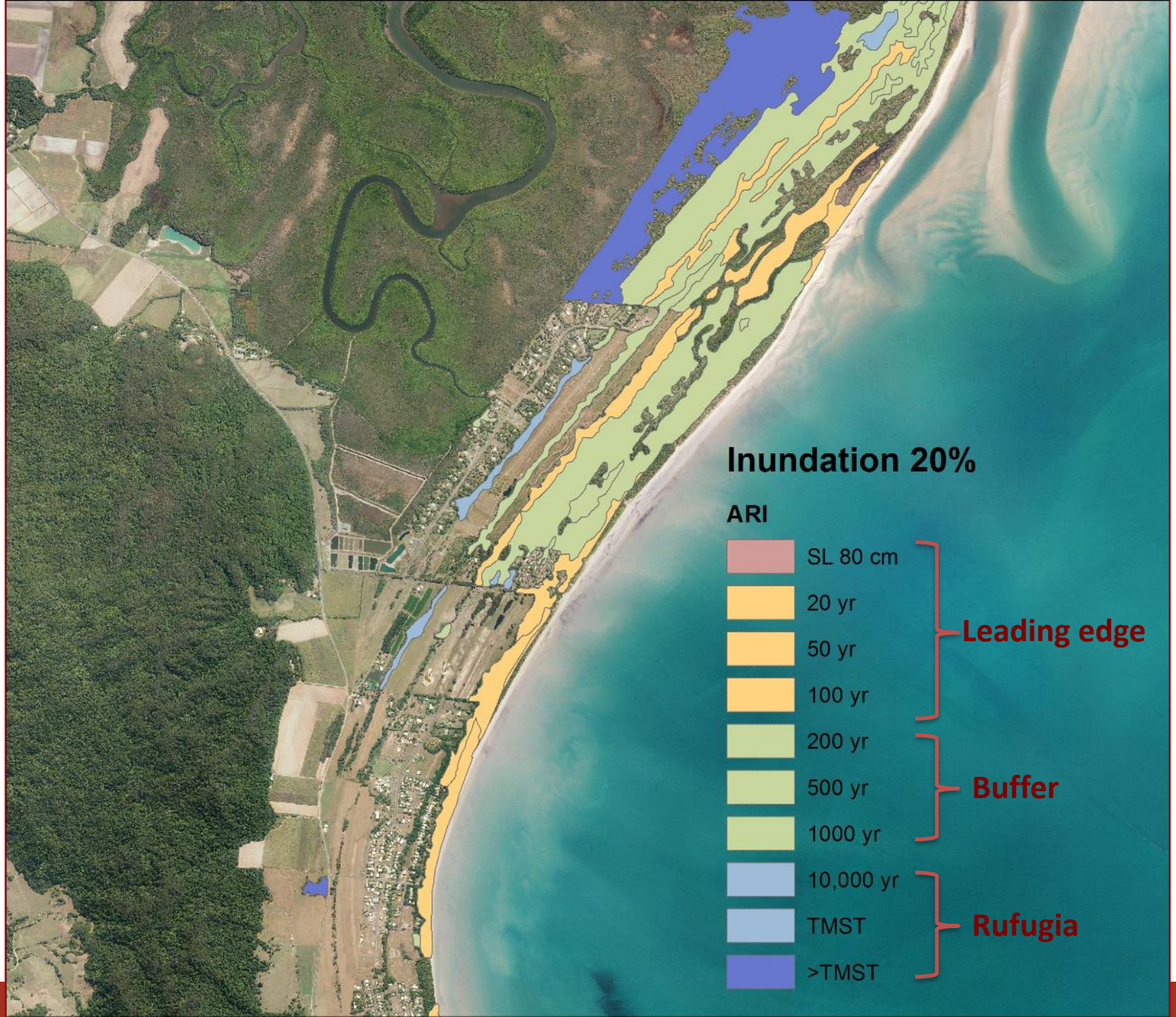

1000 Yr
Inundation
< 20%
20 - 50%
> 50%


TMST
Inundation
< 20%
20 - 50%
> 50%

Storm surge and inundation

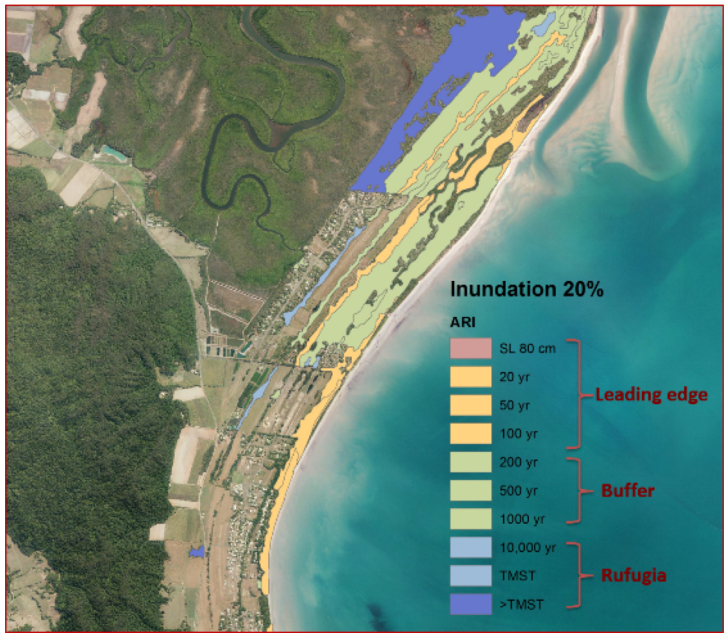


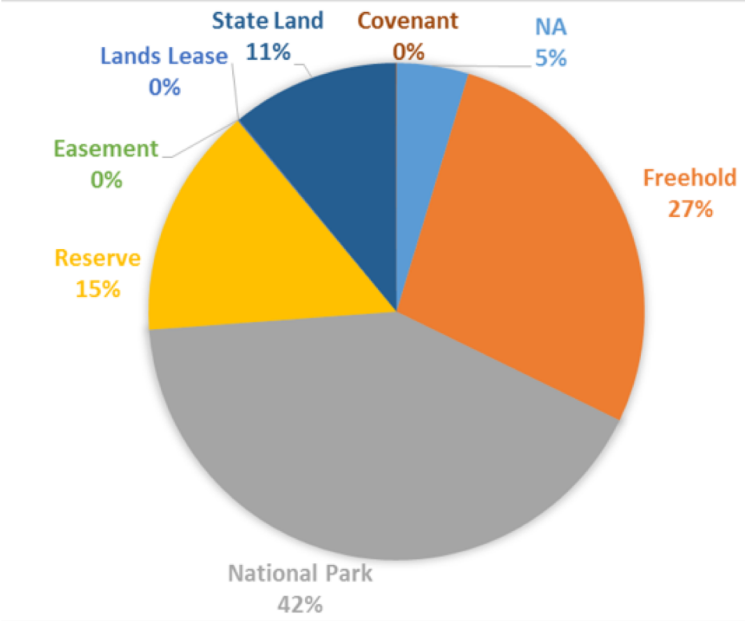

Inundation 20%
ARI
SL 80 cm
20 yr
50 yr
100 yr
200 yr
500 yr
1000 yr
10,000 yr
TMST
>TMST


Inundation 20%
ARI
SL 80 cm
20 yr
50 yr
100 yr
200 yr
500 yr
1000 yr
10,000 yr
TMST
>TMST
Leading edge
Buffer
Rufugia

Management

LRF role	Characteristics	Management actions
Refugia	Exposed infrequently	• Consider enhanced/formal protection status for areas not in the Protected Area Estate • Rehabilitate degraded patches and enhance size and connectivity of patches • Reduce pressures (e.g. invasive species, access impacts)
Buffer	Exposed moderately to infrequently	• Consider enhanced/formal protection status for areas not in the Protected Area Estate that are critical for connecting leading-edge and refugial areas • Manage pressures (e.g. invasive species, access impacts) • Prioritise restoration in areas where buffer vegetation provides connectivity between leading-edge and refugial vegetation or where it provides critical services
Leading-edge	Exposed frequently	• Prioritise management in areas where critical services are provided • Stabilisation and/or facilitated natural colonisation to speed recovery following inundation impacts in areas providing critical services • Formalise planning mechanisms to allow retreat in areas not already developed





Recovery Plan

Australian Government
Department of the Environment and Energy

Littoral Rainforest and Coastal Vine Thickets of Eastern Australia Ecological Community

Draft National Recovery Plan

February 2017

Increase the resilience of Littoral Rainforest

Research/Information

a. Classify patches of Littoral Rainforest at local and regional scales in terms of their leading edge, buffer and refugial zones (see Murphy et al., 2016).

On-ground

Action 3.3
High priority

b. Prioritise management within patches of Littoral Rainforest as follows:
   - prioritise protection of leading edge zones which provide critical services;
   - prioritise restoration in areas where buffer vegetation provides connectivity between leading edge and refugial vegetation or where it provides critical ecosystem services;
   - prioritise protection of refugial vegetation wherever possible.

c. Support local councils to include Littoral Rainforest in conservation zones.
d. Identify and implement methods to protect refugial zones of Littoral Rainforest.
e. Collect and store seeds in appropriate regional seedbanks to ensure the long-term conservation of key species.
f. Propagate seeds of key species for use in restoration plantings.

Improve knowledge of the extent and condition of Littoral Rainforest

Research/Information

a. Finalise and distribute protocols for the fine-scale mapping of Littoral Rainforest.
b. Establish a baseline against which to measure condition and patch quality.
c. Assess whether conditions exist for Littoral Rainforest to extend inland further than the recognised 2 km limit in particular bioregions, such as Cape York Peninsula where the ecological community may extend up to 10 km inland.

Action 5.2:
High priority

On-ground

d. Undertake local and regional level fine-scale mapping of Littoral Rainforest to confirm the extent and condition of the ecological community across its range.
e. If there are circumstances in which Littoral Rainforest is found to extend further than 2 km inland, update the key diagnostic characteristics to reflect this.

CASE STUDY

Succession and Littoral Rainforest in the Wet Tropics Bioregion*

**Information provided by Andrew Ford, CSIRO Land and Water, Atherton*

Succession in vegetation is generally regarded as a time-related progression from one type of vegetation to another through a series of frequently identifiable events. Change in vegetation is initiated by the reduction or addition of a number of underlying factors which have the potential to drive the current vegetation along a gradient of transition towards another type of vegetation. This gradient can vary dramatically, and is often a reflection of altitude, substrate, rainfall patterns or soil types.

The expected and classical rainforest successional theory proposes that a system initially has no vegetation. Over time small herbs and grasses colonise this vacant space, and with more time small shrubs begin to appear. Larger plants can only colonise these herb dominated areas once sufficient organic matter and soil (with sufficient minerals and nutrients) accumulates. Once larger shrubs and small trees become established they offer habitat to fruit-eating animals which then disperse many and varied species throughout the new ecosystem. The general pattern in tropical areas is for large-leaved and fast growing shade intolerant tree species to appear first, followed by slower growing and smaller leaved shade tolerant species. This is a very simplistic version of events, which theoretically holds for the majority of lowland to mid-elevation rainforest vegetation types.

Littoral Rainforest occurs in close proximity to the ocean and is influenced by maritime processes. Sands deposited from the ocean over millennia have created ideal conditions for the development of Littoral Rainforest, which follows a similar trajectory to that of classical rainforest succession. Colonisation of sand deposits starts with herbs, which initially stabilise the sand with root growth and later aid in the accumulation of organic matter which then supports woody species recruitment. Fire is crucial to the maintenance of sclerophyll vegetation on sand, reducing fire frequency will aid the transition towards rainforest.

The transition process on sand takes a slightly different trajectory to that encountered on other substrates. Invading rainforest species tend to be future long-lived canopy species, rather than the truly successional

during this period (DELWP, 2016). Major population centres in East Gippsland (likely to be impacted) include Lakes Entrance, where Littoral Rainforest occurs. Ramsdale and Orbost (DELWP, 2016).

In addition to the direct impacts of land clearing, coastal development can also result in a wide range of other indirect impacts to Littoral Rainforest, such as increased weed invasion, dumping of garden waste and other rubbish, and disturbance to native fauna from domestic pets (BAAM, 2013).

Figure 3: Clearing of vegetation for a residential development adjacent to Littoral Rainforest. The patch was incorrectly defined in Regional Ecosystem mapping but following ground surveys was identified as Littoral Rainforest. (© Helen Murphy).

2.2.2 *Tourism and vector disturbance*

In addition to coastal development, tourism and vector disturbance within Littoral Rainforest pose an ongoing threat. According to the Bureau of Tourism Research (DISR, 2001), 30% of international visits and 40% of domestic visits are to coastal areas. Due to the ongoing demand for tourism and recreational facilities for users of coastal and marine ecosystems (Ward & Pullar 2006) this trend is likely to increase over time. Such pressure is likely to result in more development on coastal

Local and Regional impacts

Qld Parks and Wildlife (Marine Parks) - Mapping LRF where RE mapping is absent

Local and Regional impacts

Working (and training) local government employees to identify LRF

Northern Australia Environmental Resources Hub

National Environmental Science Programme

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