National Environmental Research Program

TROPICAL ECOSYSTEMS hub

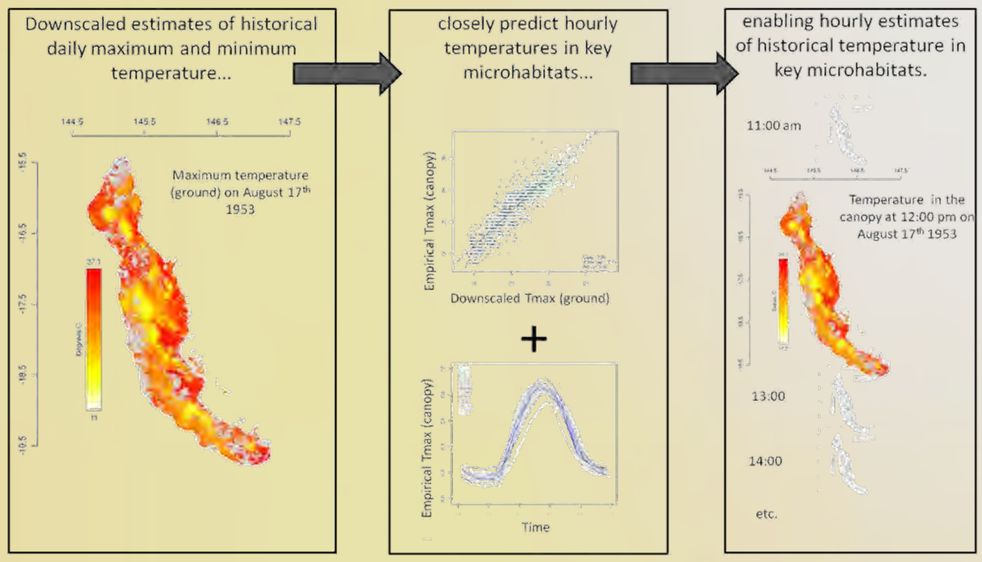
Project 7.3 - Climate change and the impacts of extreme events on Australia's Wet Tropics biodiversity

Changes in the regimes of extreme climate and weather events are the principle way in which people, animals and plants experience climate change. However, little is known about how such events affect biodiversity, especially in the tropics.

Our project investigates the ***exposure*** and the ***sensitivity*** of the Wet Tropics vertebrates to extreme temperature events in order to quantify the ***vulnerability*** of these organisms to such events.

Quantifying 'exposure'

Exposure is a function of temperature at the landscape scale, and how it filters down to the microhabitats in which organisms live. Using empirical data and sophisticated statistical downscaling techniques we have generated detailed hourly estimates of temperatures in a suite of microhabitats occupied by Wet Tropics vertebrates.



Example: Schematic representation of our approach for quantifying the thermal exposure as experienced in key-microhabitats (canopy, litter, soil, logs)

Quantifying 'sensitivity'

Sensitivity is a function of the ability of organisms to 1) seek out cooler microhabitats; 2) physically withstand extreme temperatures; and 3) quickly increase in numbers after the temperature event ('resilience'). Using information on behaviour, thermal physiology, and life-history we are currently generating detailed estimates of these three traits.

Rank	Resilience index	Binomial species' name	Common name	IUCN Status
1	0.000	*Techmarscincus jigurru*	Bartle Frere cool-skink	NL
2	0.001	*Eulamprus frerei*	Bartle Frere barsided skink	NL
3	0.009	*Cophixalus neglectus*	Tangerine nursery-frog	EN B1ab(v)+2ab(v)
4	0.087	*Hemibelideus lemuroides*	Lemuroid ringtail possum	LR NT
5	0.091	*Cophixalus monticola*	Mountain top nursery-frog	EN B1ab(v)+2ab(v)
6	0.100	*Cophixalus hosmeri*	Pipping nursery-frog	VU D2
7	0.103	*Lampropholis robertsi*	Grey-bellied sunskink	NL
8	0.104	*Trichosurus vulpecula johnstonii*	Coppery brushtail possum	LR LC
9	0.105	*Taudactylus rheophilus*	Northern tinkerfrog	CR A2ac; B2ab(v)
10	0.109	*Antechinus godmani*	Atherton antechinus	LR NT
11	0.111	*Saproscincus czechurai*	Saproscincus czechurai	NL
12	0.112	*Sminthopsis leucopus*	White-footed dunnart	DD
13	0.116	*Glaphyromorphus mjobergi*	Atherton Tableland mulch-skink	NL
14	0.120	*Pseudochirulus herbertensis*	Herbert river ringtail possum	LR NT
15	0.123	*Acanthiza katherina*	Mountain thornbill	LC
16	0.123	*Uromys hadrourus*	Masked white-tailed rat	LR NT
17	0.125	*Prionodura newtoniana*	Golden bowerbird	LC
18	0.128	*Ptilonorhynchus violaceus*	Satin bowerbird	LC
19	0.128	*Dasyurus maculatus*	Spotted-tailed quoll	VU C1+2a
20	0.130	*Sericornis keri*	Atherton scrubwren	LC

Example: Top 20 of least resilient species among 200 Wet Tropic's vertebrates (0 = least resilient).

Quantifying 'vulnerability'

We will combine our estimates of exposure and sensitivity to quantify the vulnerability of the biodiversity of the Wet Tropics to extreme temperature events. From this we can produce a whole suite of products useful for predicting and managing the impacts of such events in the bioregion.

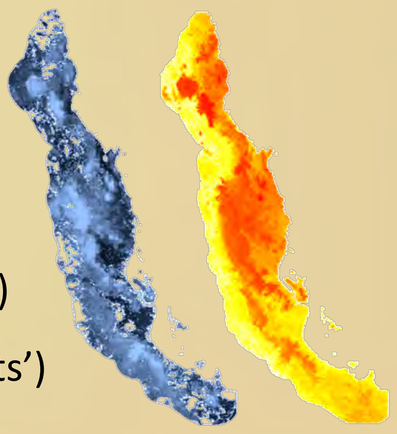
Outputs

List of priority species

Maps of priority areas

i.e. areas where biodiversity is

- least vulnerable ('thermal refugia')
- most vulnerable ('thermal hotspots')



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