

The Biodiversity & Climate Change Virtual Laboratory

Sarah Richmond, Project Manager



**Understanding
the response
of biodiversity
to climate
change is a
complex
problem**

Biodiversity Modelling



Duskywing
skipper & oaks

Species interactions

Interaction matrices
to predict novel
communities



Meadow brown



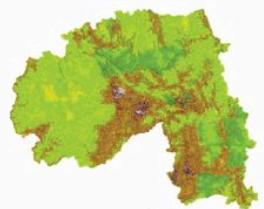
Emperor penguin



Dengue
mosquito

Evolution

Quantitative genetic or
genetically explicit models to
predict adaptive responses



Simulated land use

Environment

Predicting land-
use changes at
relevant scales



Cane toad

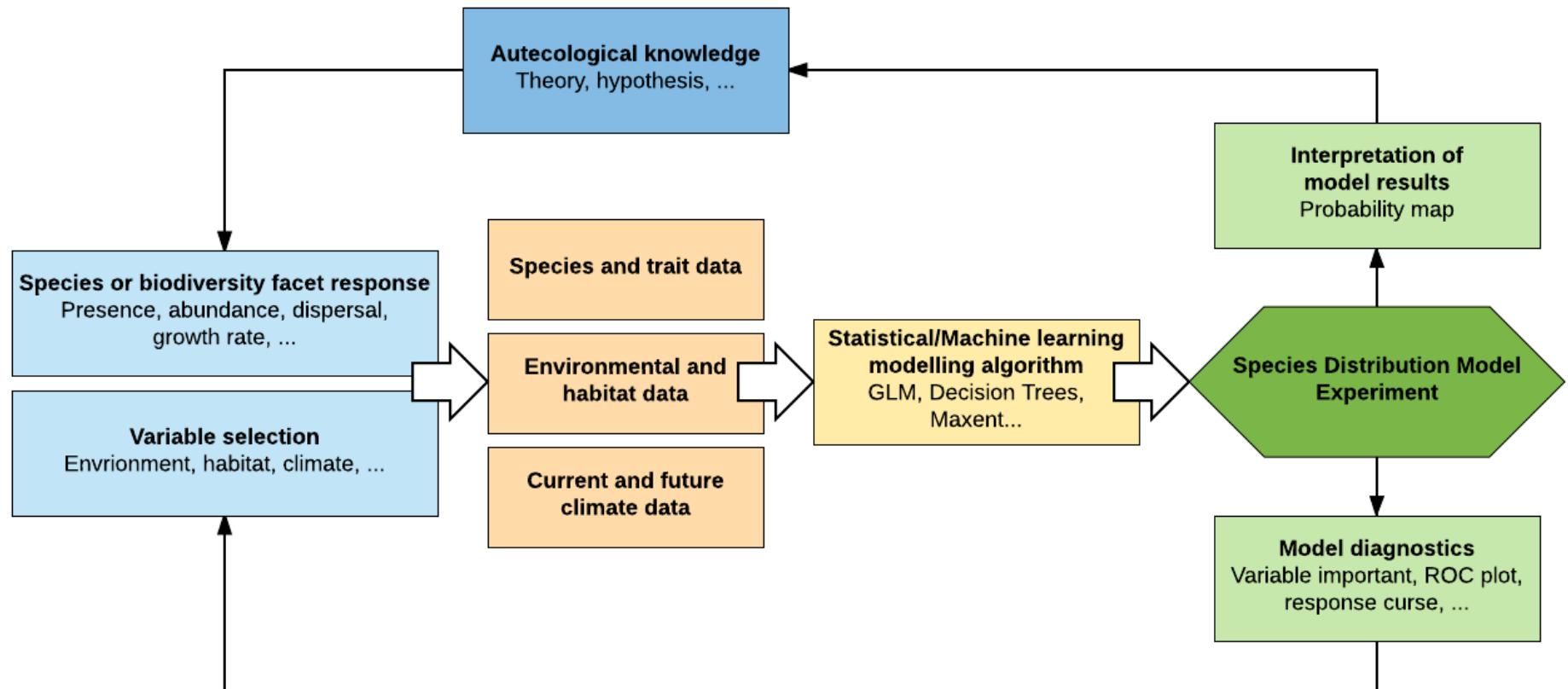
Demography

Climate-dependent
demography to predict
population dynamics

Physiology

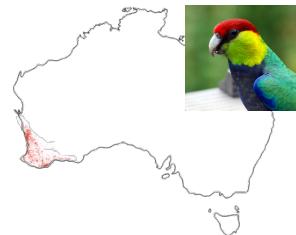
Energy and mass
balance to predict
physiological responses

SDMs provide workflow for improving understanding



Requires lots of data and analytical capacity

Species data

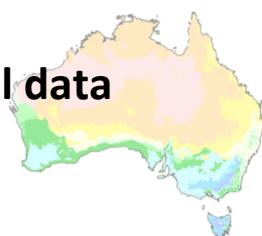


Presence / Absence / Abundance
~1.6 million species catalogued
~310,000 plants
~1 million animals
~80% not yet described

Other facets of biodiversity

- Genetic diversity
- Species traits
- Functional units

Climate and environmental data



Current climate: mean climate, bioclimatic indices, extreme events

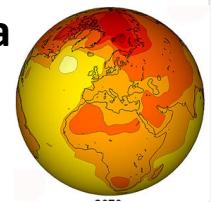
Land cover: natural vegetation, primary productivity, land use change

Soil, substrate

Topography, altitude

Hydrology: run-off, streams and lakes

Future climate data



170+ plausible future climates
• 40+ global climate models
• 4 climate change scenarios

984 monthly time steps to 2100

Mean future climate, bioclimatic indices, extreme events

510 million x 1 km pixels



www.bccvl.org

Biodiversity and
Climate Change
Virtual Laboratory



www.bccvl.org

- Removing technical barriers to accessing biodiversity-climate change modelling
- Raising the standard of SDMs
- Simplified access and visualisation of disparate data collections
- Extensive training programs and resources



A big collaborative effort...



UNSW
THE UNIVERSITY OF NEW SOUTH WALES



MACQUARIE
University



Build on expertise



Prof Brendan Mackey
Climate Change
Griffith University



A/Prof Shawn Laffan
Geospatial analysis/ Biodiversity
University of New South Wales



A/Prof Sama Low Choy
Statistics
Griffith University



A/Prof Jeremy VanderWal
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Macquarie University



A/Prof Mark Kennard
Freshwater ecology
Griffith University



A/Prof Fabiana Santana
Computer Science
University of Canberra



Mr Lee Belbin
Ecology
Atlas of Living Australia



Prof Emeritus Henry Nix AO
Climate Change



Demo

Secure | https://www.ala.org.au

Atlas of Living Australia

ala.org.au

Search the Atlas ...

Log in

Start exploring ▾ Search & analyse ▾ Participate ▾ Learn about the ALA ▾



The **Atlas of Living Australia** is a collaborative, national project that aggregates biodiversity data from multiple sources and makes it freely available and usable online.

Occurrence Records
71,890,562

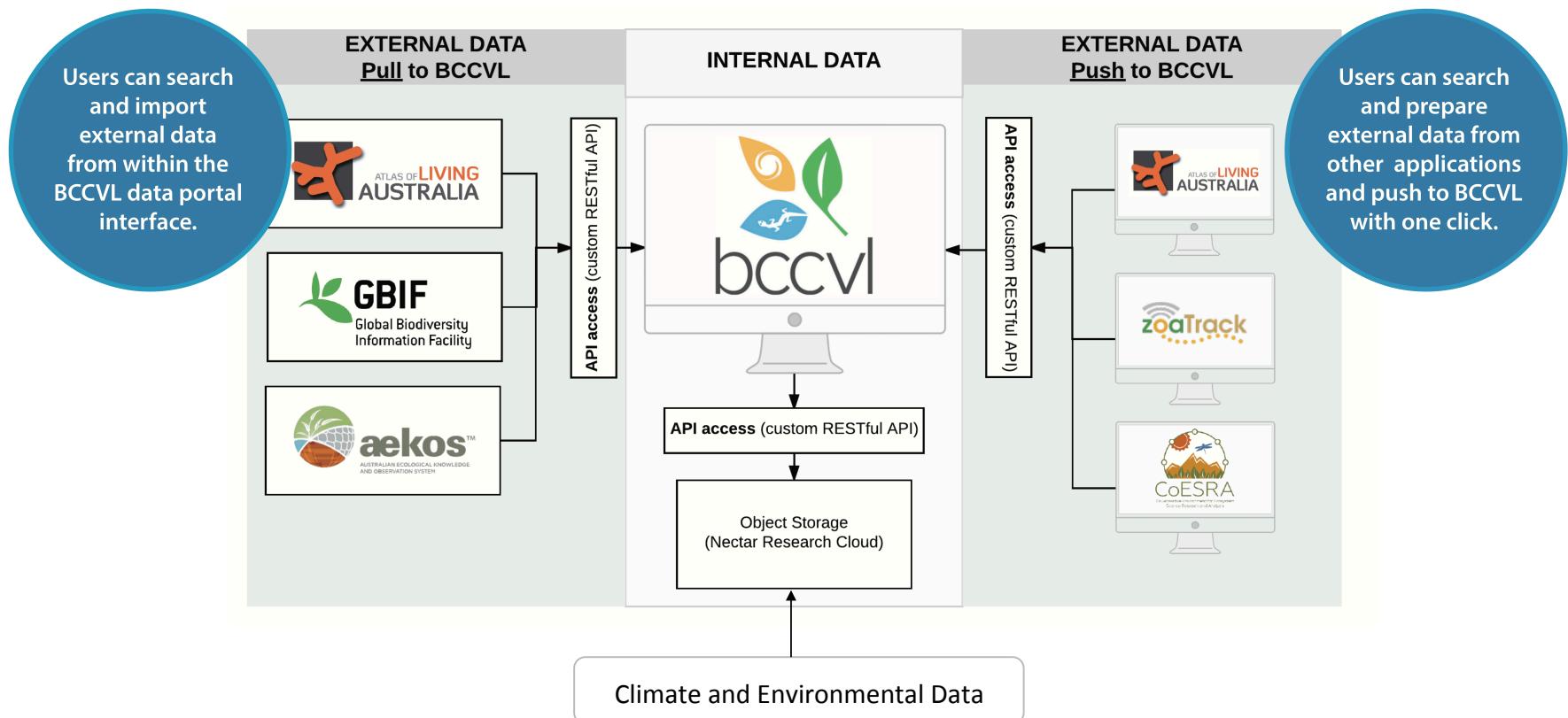
Species
120,043

Data downloads
1,580,935

Registered users
39,673

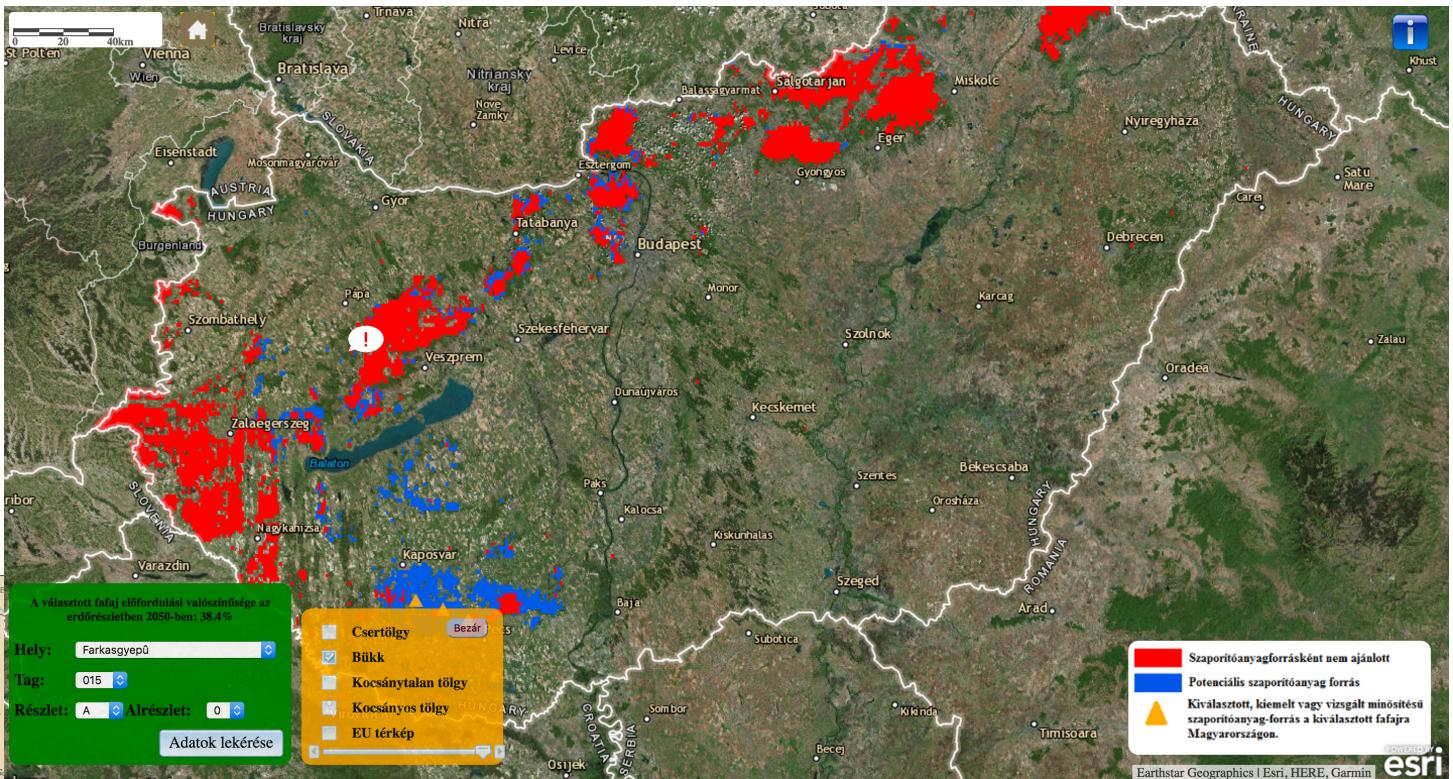


Push / Pull Data Model



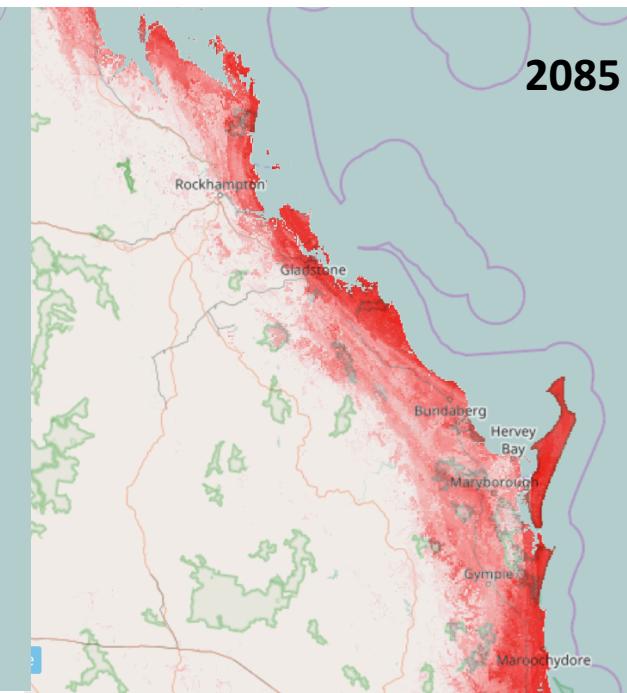
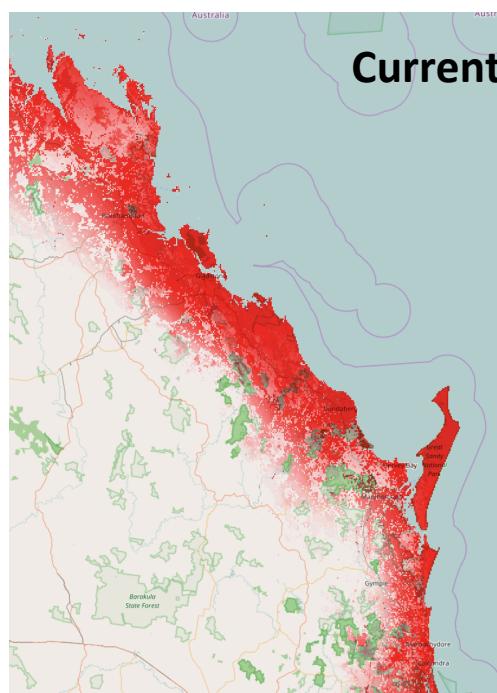
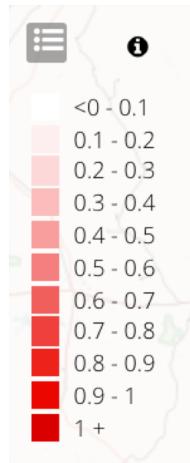
Our users do cool things!

Supporting forest managers in finding pre-adapted tree populations to build climate resilient forests for the future

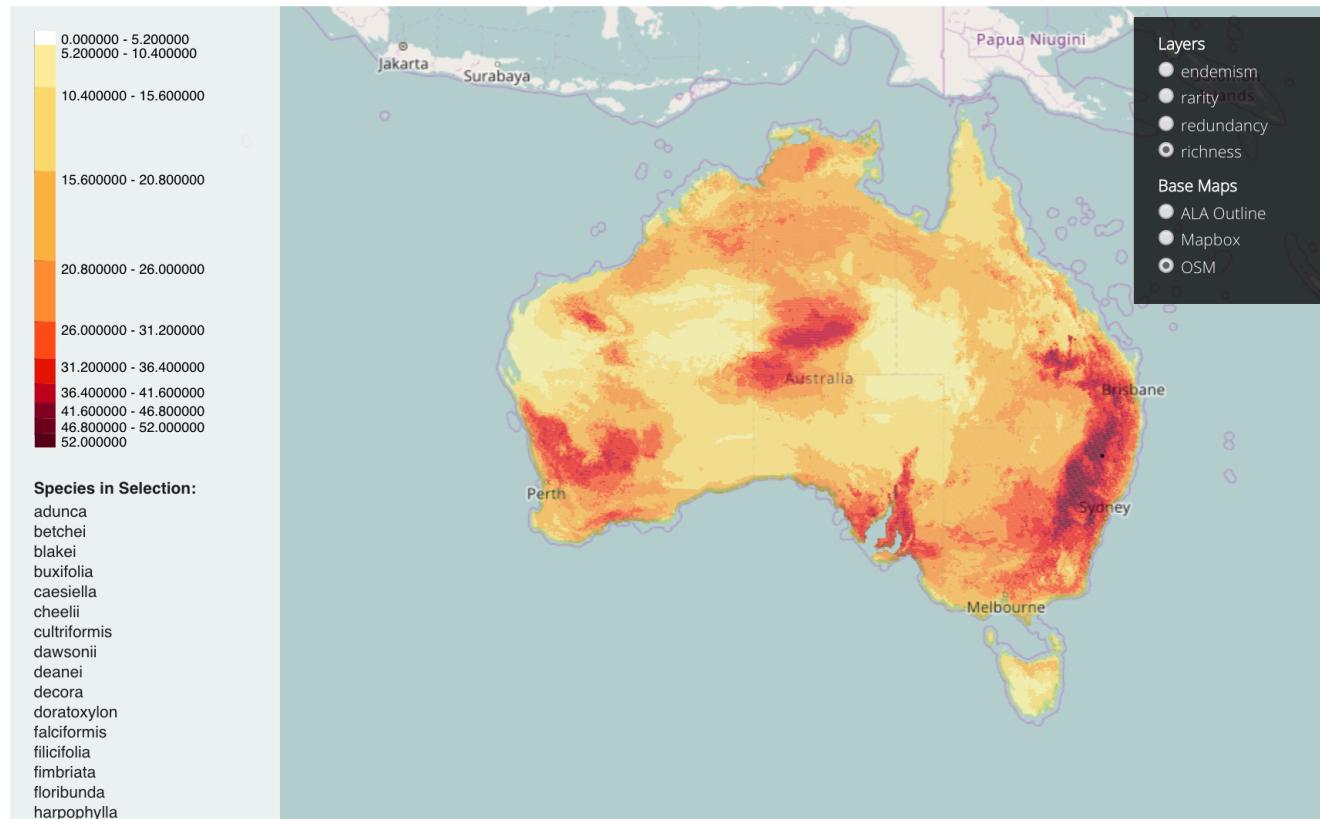


Our users do cool things!

Local government mapping raptor nests to inform management decisions



Our users do cool things!

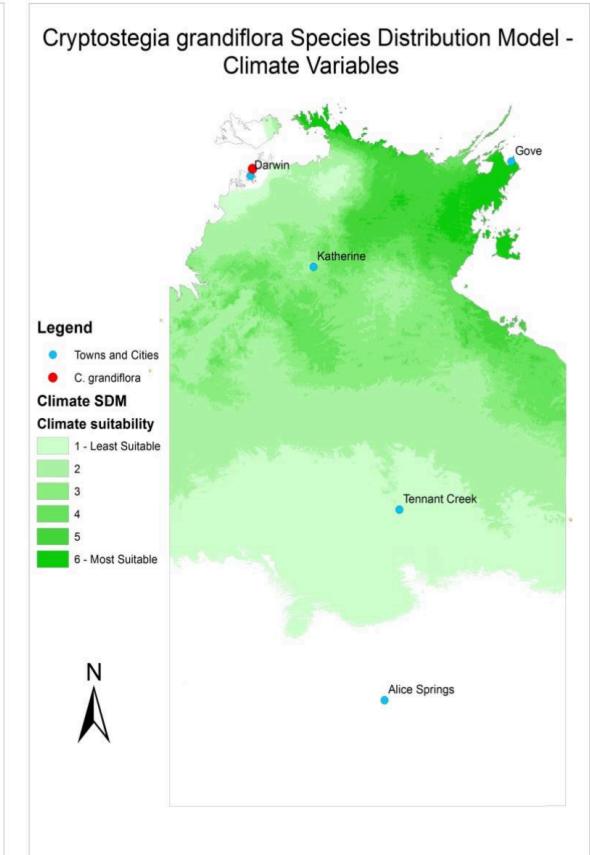
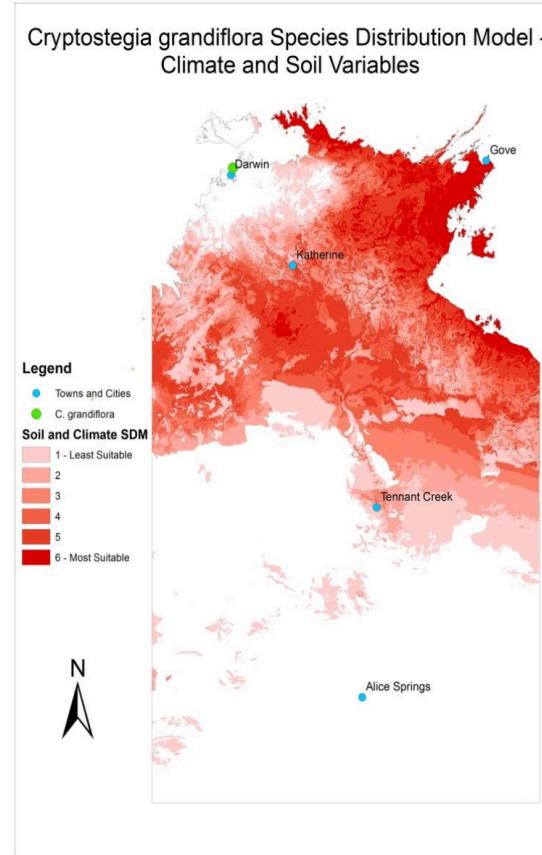
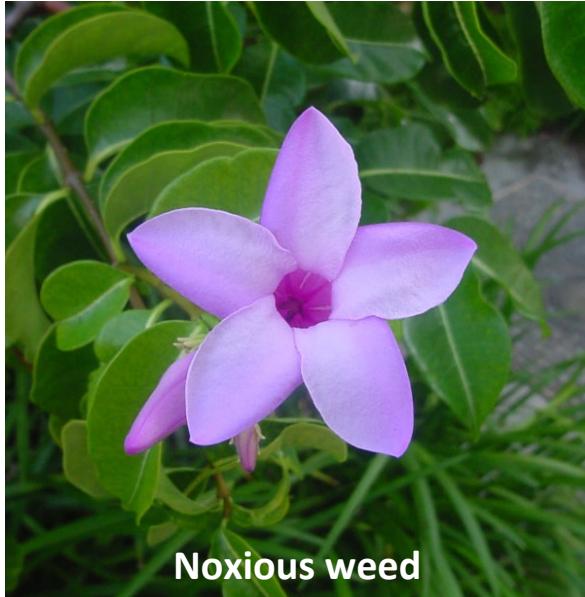


Modelling hotspots
of richness for
>500 acacia
species

3 months – 1 hour

Our users do cool things!

Refining models at the click
of a button



Enabling developing countries

Modelling species of interest in Tanzania



Modelling an invasive species in Indonesia

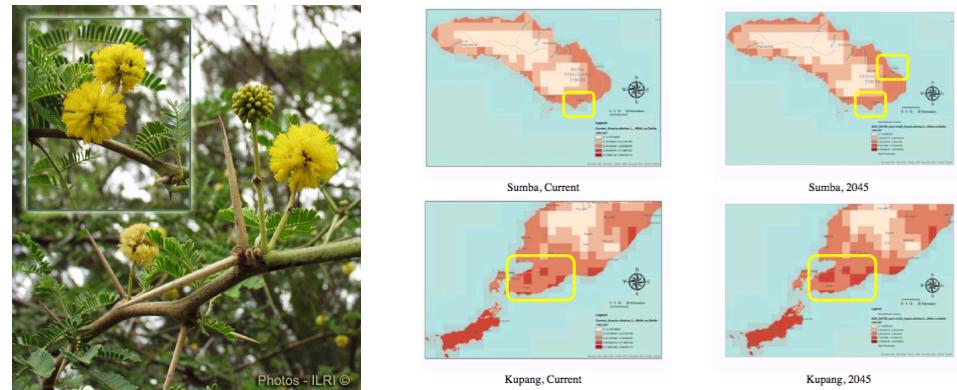
TROPICAL DRYLANDS
Volume 1, Number 1, April 2017
Pages: 36-42

Species distribution model of invasive alien species *Acacia nilotica* for Central-Eastern Indonesia using Biodiversity Climate Change Virtual Laboratory (BCCVL)

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Manuscript received: 6 January 2017. Revision accepted: 23 April 2017



Paving the way for next generation researchers

Undergraduate
curriculum
assessment item

Investigation into the current and predicted distribution of *Terminalia ferdinandiana* to guide Sustainable Harvest



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