

# Humans and nature: ecology, technology and landscapes of the future



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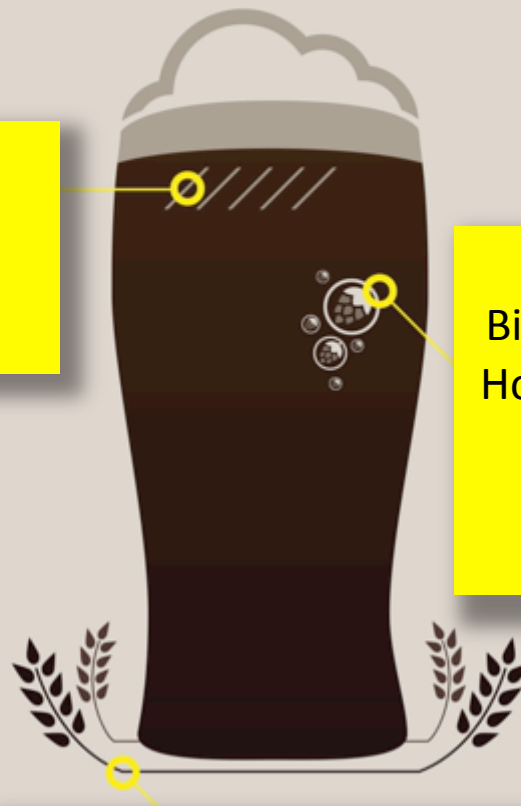
# MAKE MINE A PINT OF NATURE

Lesser-known ingredients in a pint include  
mountains, forests, bogs, rivers, oceans and all living things

Water

Biodiversity  
Hops, Yeast,  
Barley

Climate & nutrient  
regulation



Technology is the  
science of doing





Natural  
capital

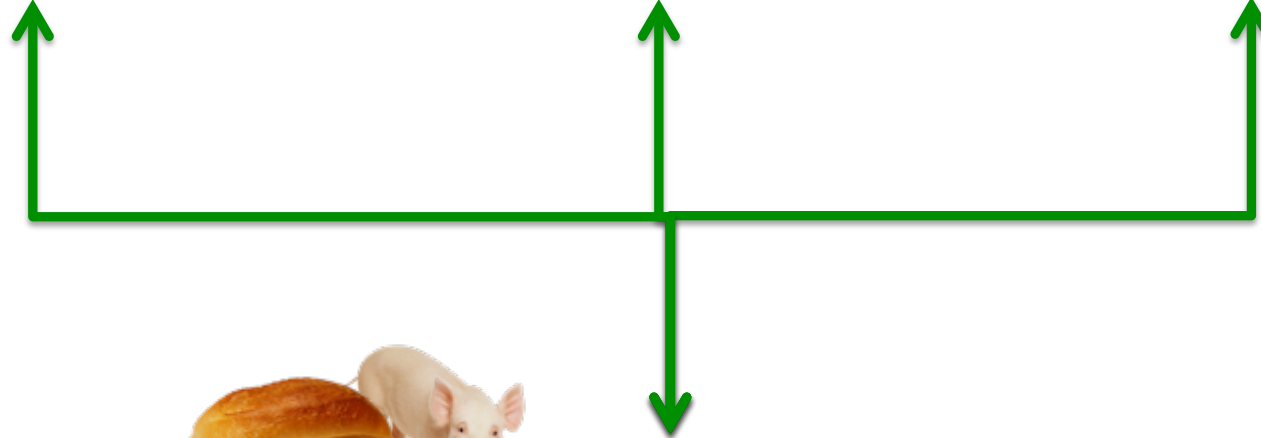
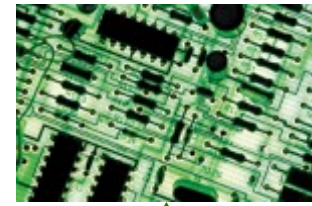


Social  
capital



Built  
capital

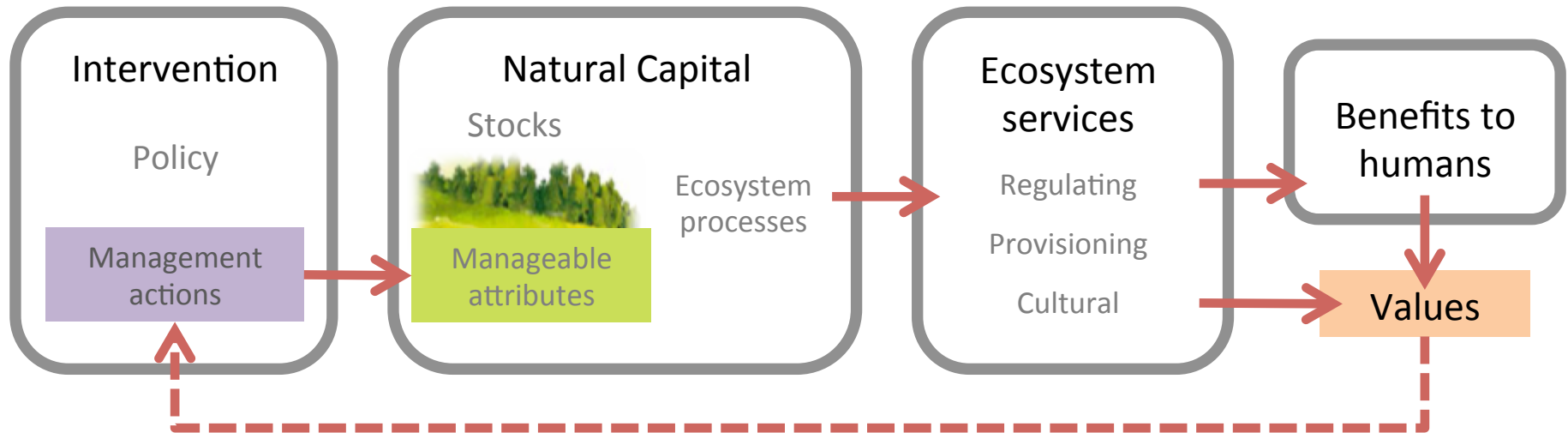
Technological  
capital



Benefits to  
humans



# Manage natural capital





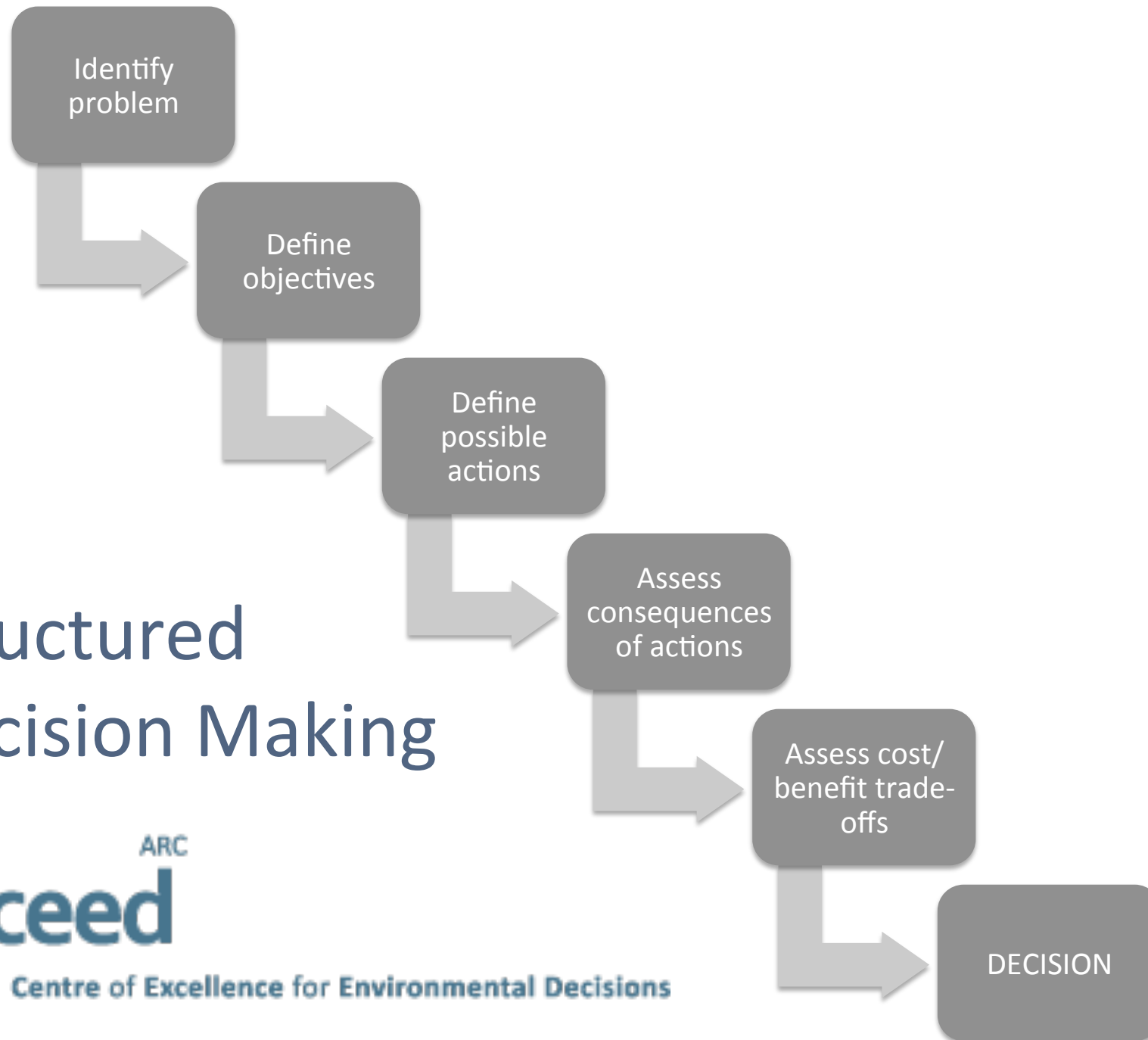






Wellbeing

# Structured Decision Making



Identify  
problem

- What will I have for dessert?

Define  
objectives

- Satisfy hunger?
- Increase pleasure?

Define  
possible  
actions

- Crème Brûlée
- Cheesecake
- Chocolate

Assess  
consequences  
of actions

- Sickness
- Happiness
- Fatness

Assess cost/  
benefit trade-  
offs

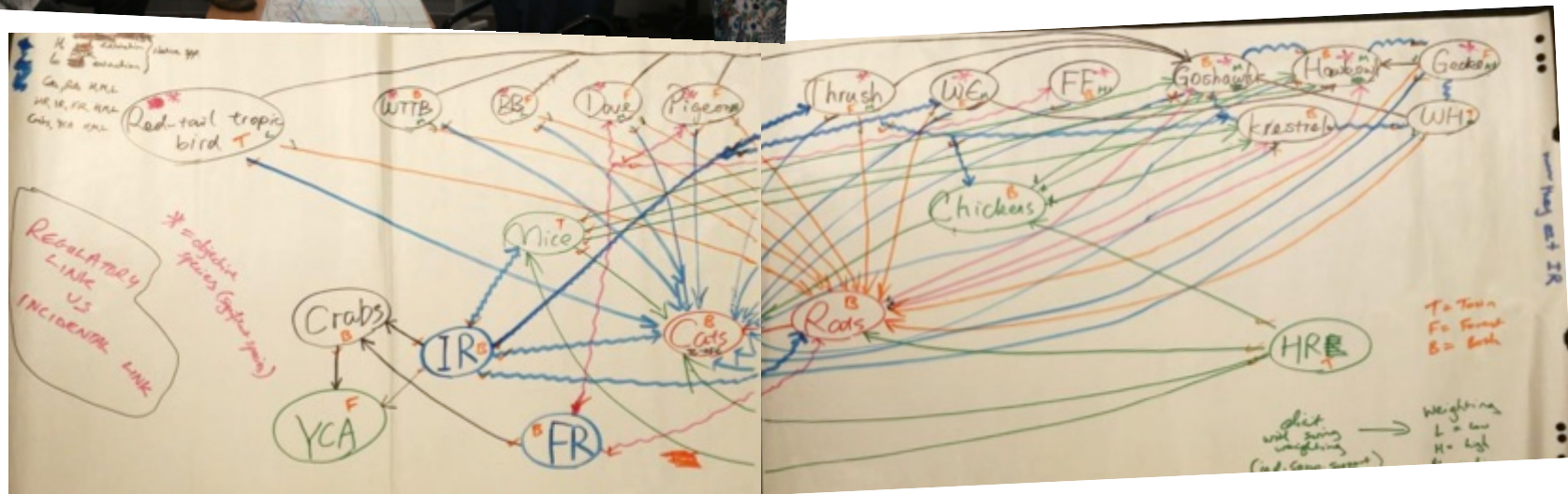
DECISION



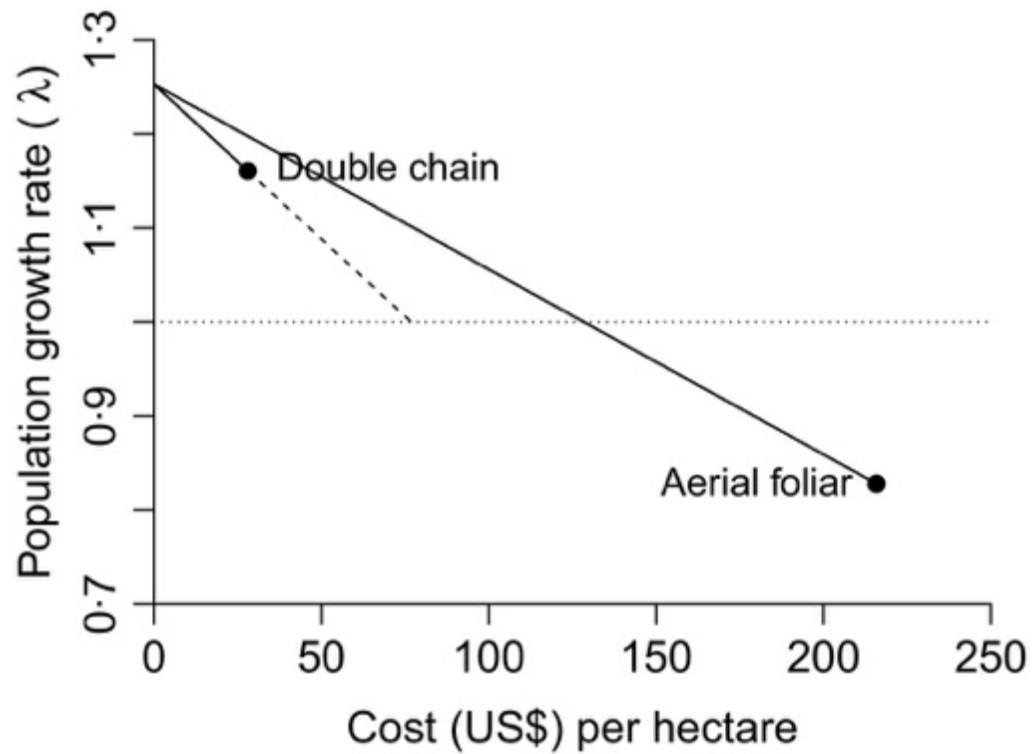
Identify  
problem

Define  
objectives

Define  
possible  
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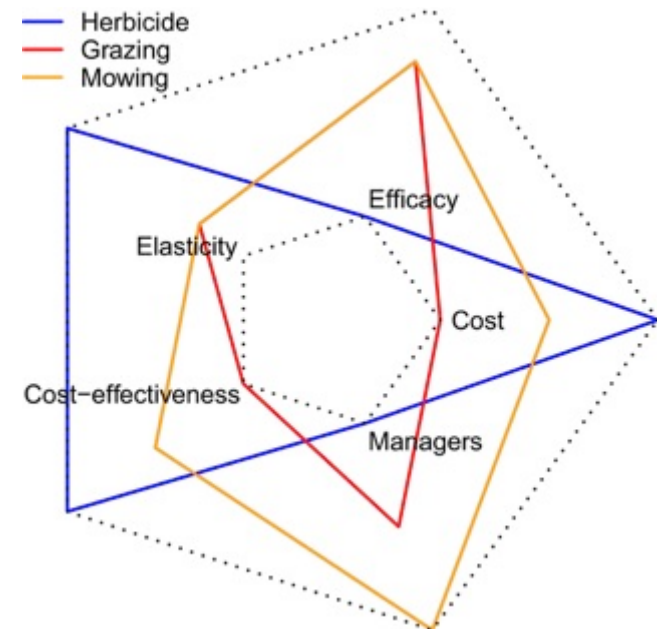






Assess  
consequences  
of actions

Assess cost/  
benefit trade-  
offs



## IDEA AND PERSPECTIVE

### Predicting species distributions for conservation decisions

Guisan et al. 2013

## Journal of Applied Ecology



*Journal of Applied Ecology* 2016

doi: 10.1111/1365-2664.12592

DEMOGRAPHY BEYOND THE POPULATION

### Prioritizing management actions for invasive populations using cost, efficacy, demography and expert opinion for 14 plant species world-wide

Kerr et al. 2016



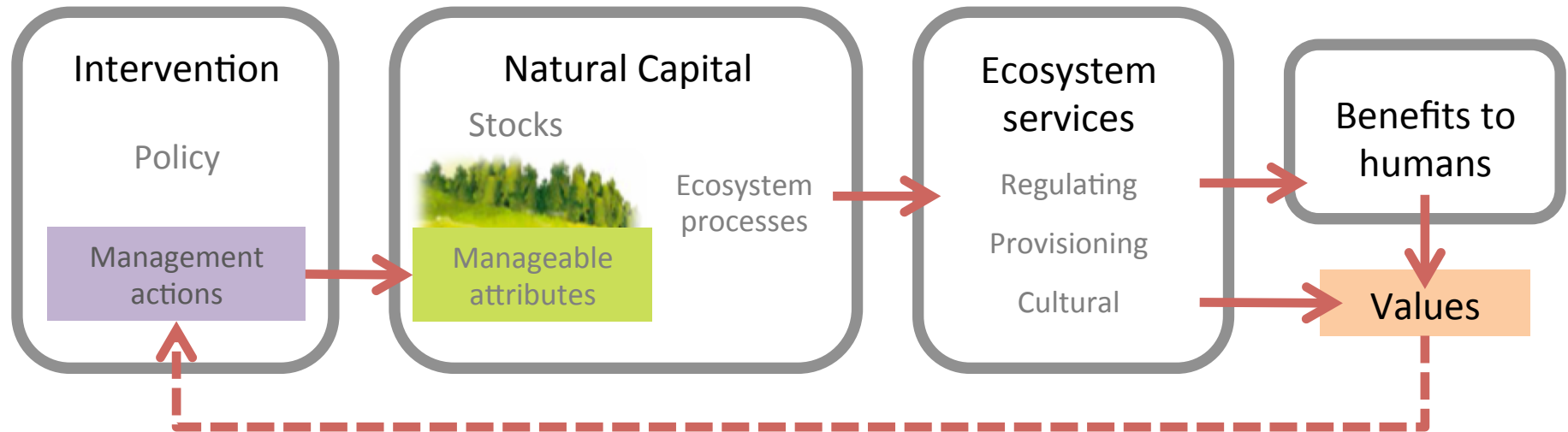
### Managing the side effects of invasion control

Buckley & Han 2014 (invited perspective)

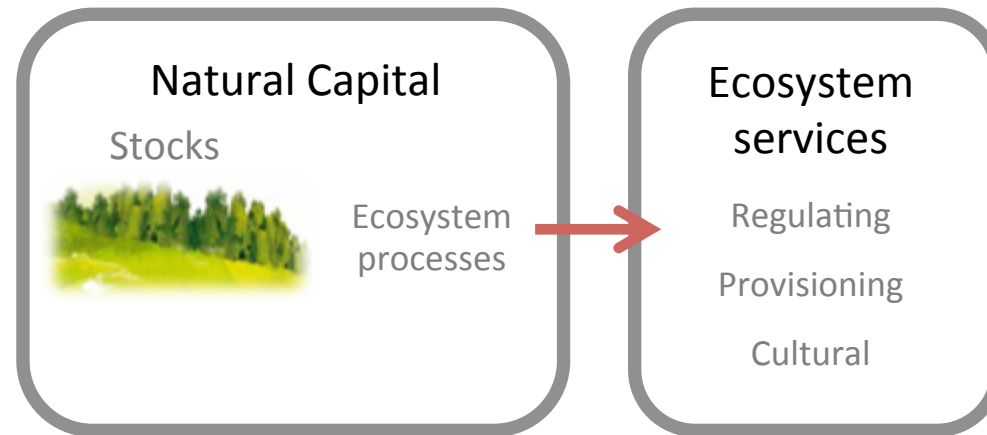
## General rules for managing and surveying networks

Chadès et al. 2011

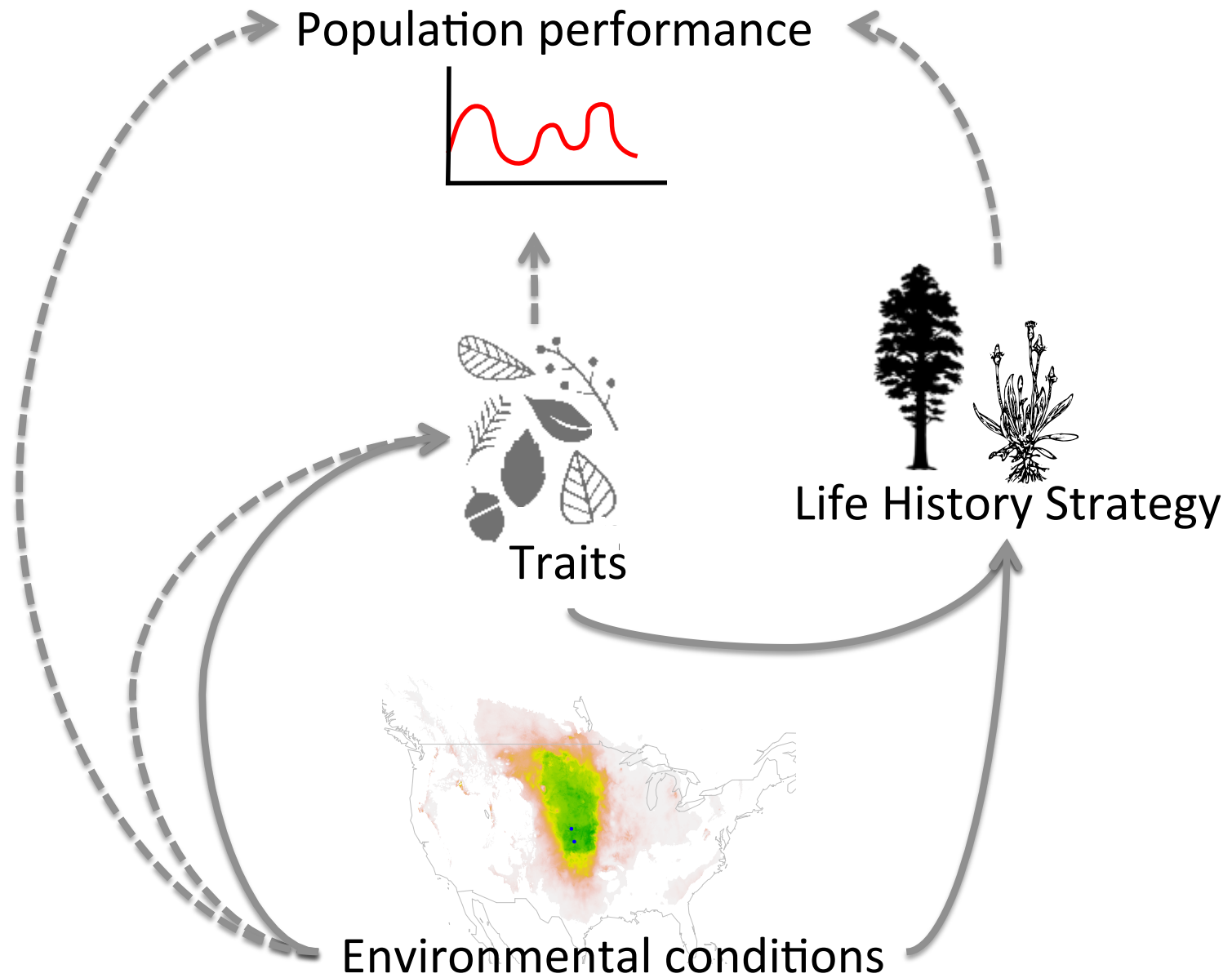
# Manage natural capital



# Understand the links from natural capital to ecosystem services







# Life history strategy... reproduction





**COMPADRE**

Plant matrix database

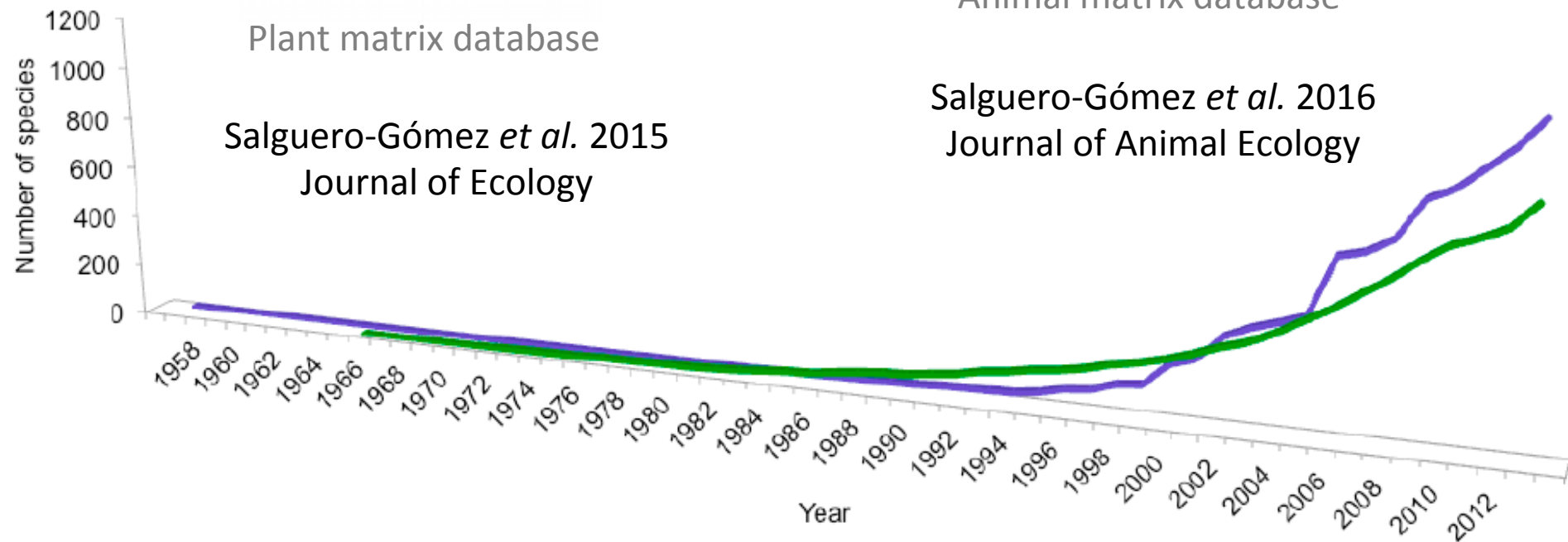
Salguero-Gómez *et al.* 2015  
Journal of Ecology



**COMADRE**

Animal matrix database

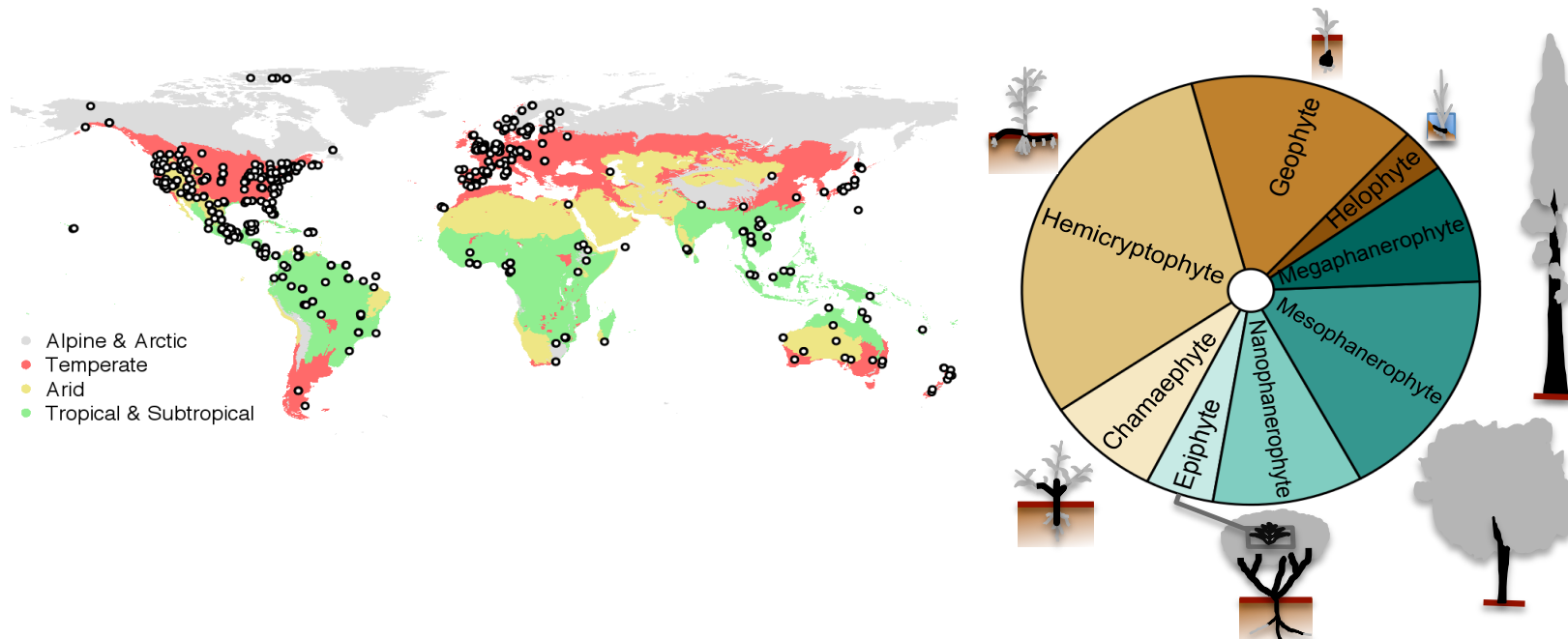
Salguero-Gómez *et al.* 2016  
Journal of Animal Ecology



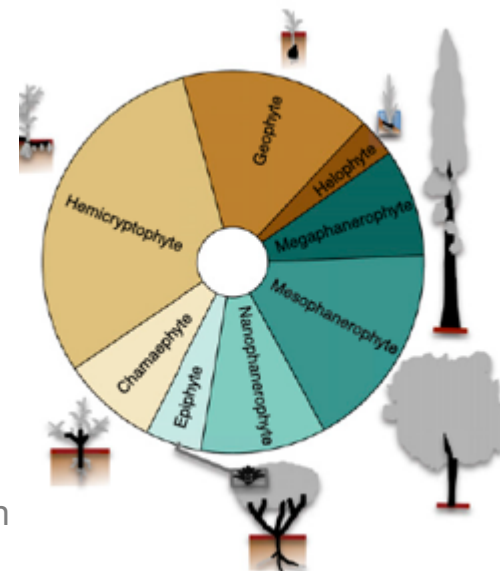
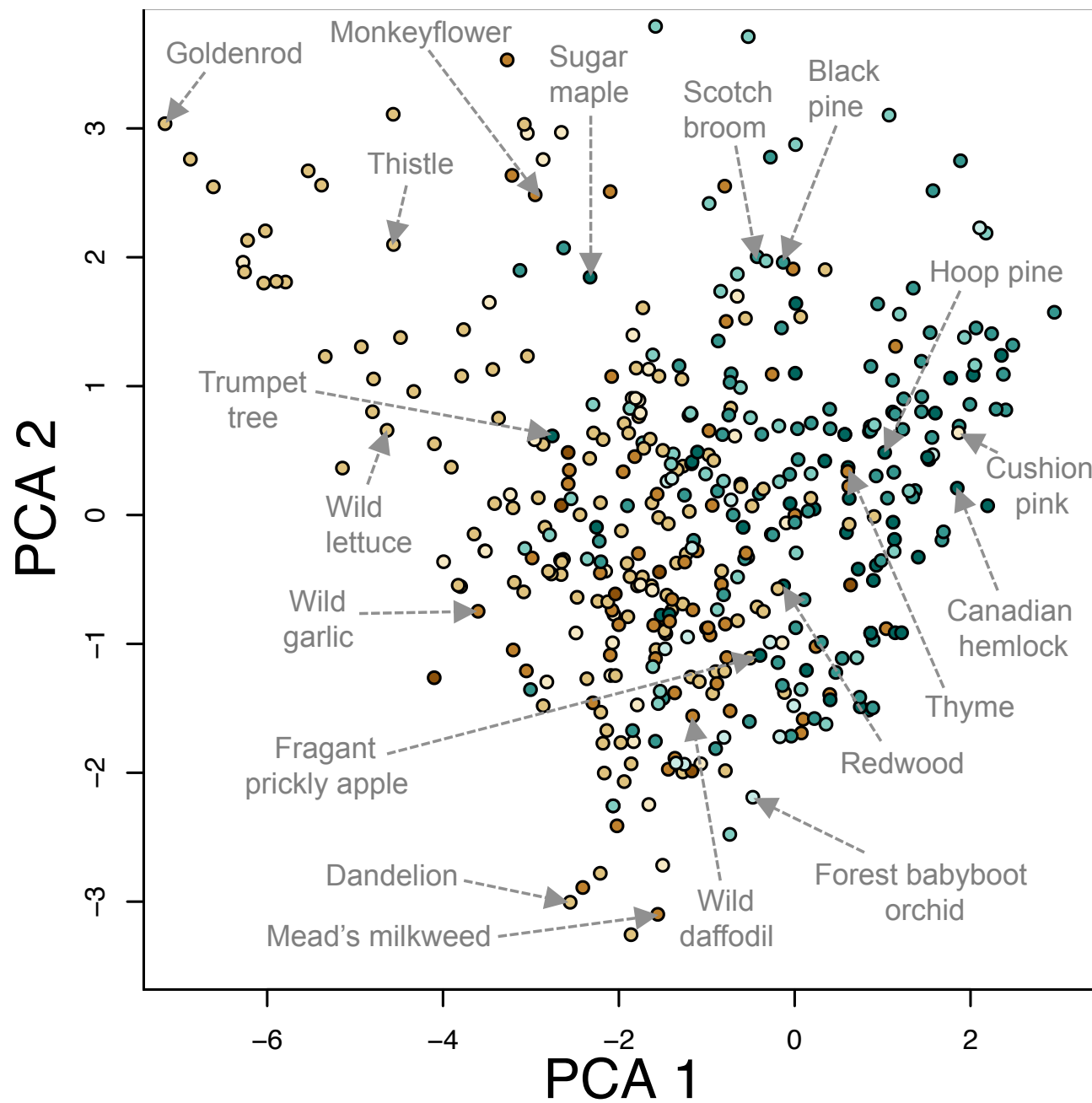
<http://www.compadre-db.org/>

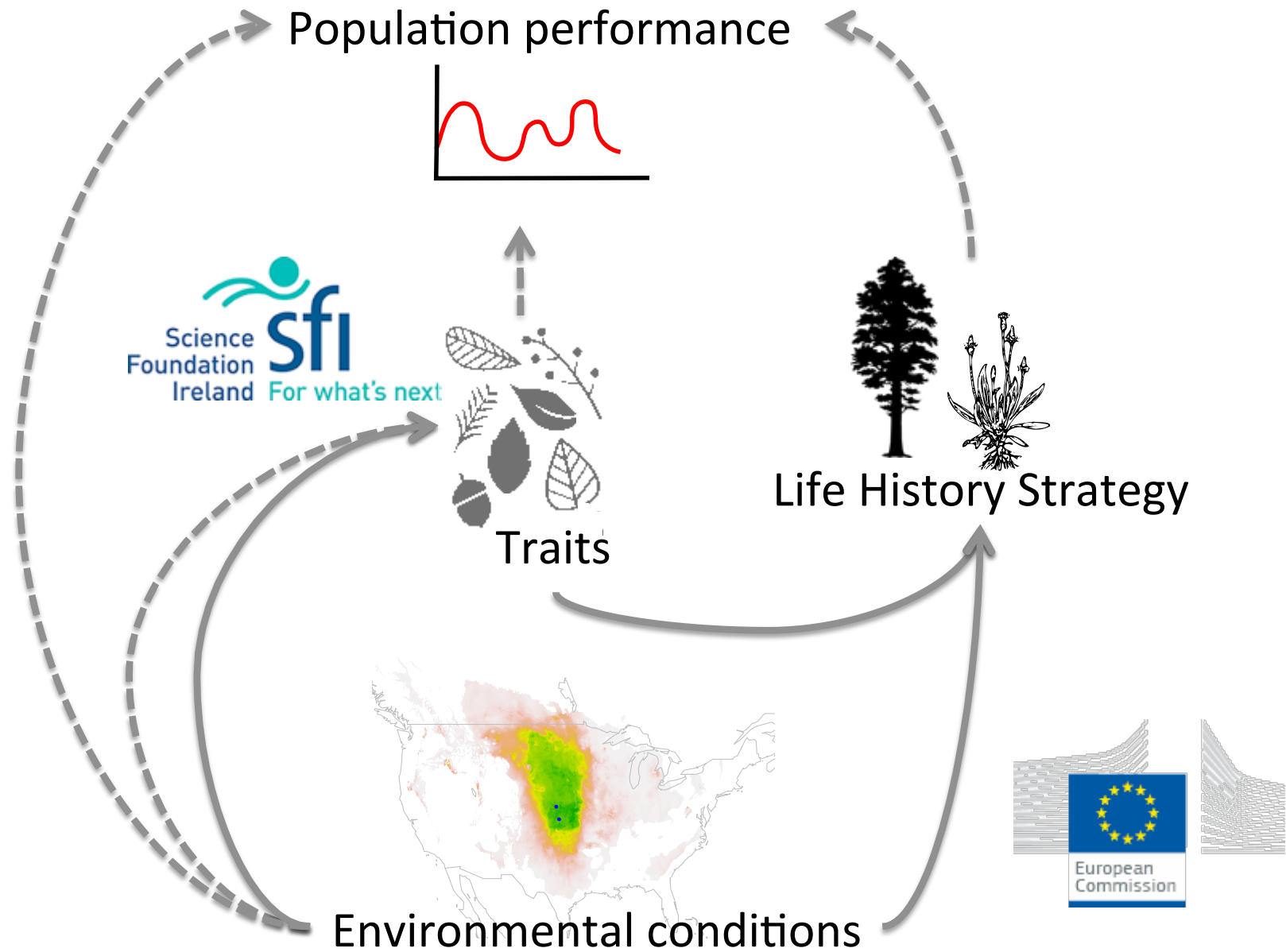
# Fast-slow continuum and reproductive strategies structure plant life-history variation worldwide

Salguero-Gomez *et al.* 2016

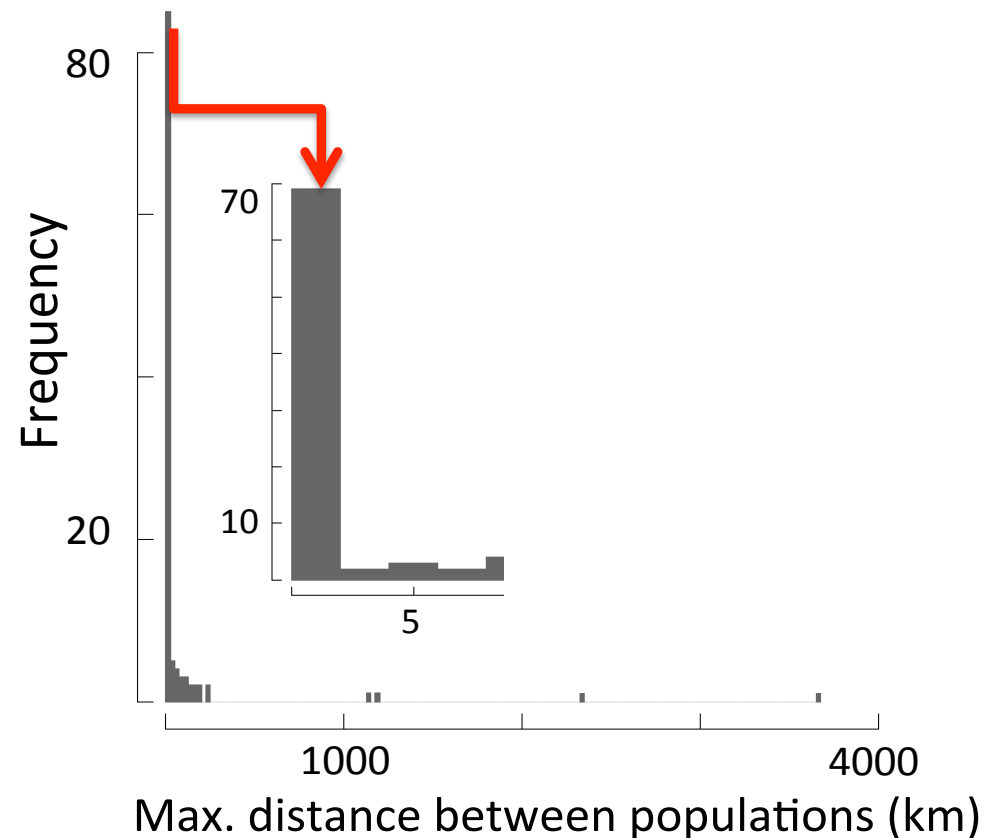




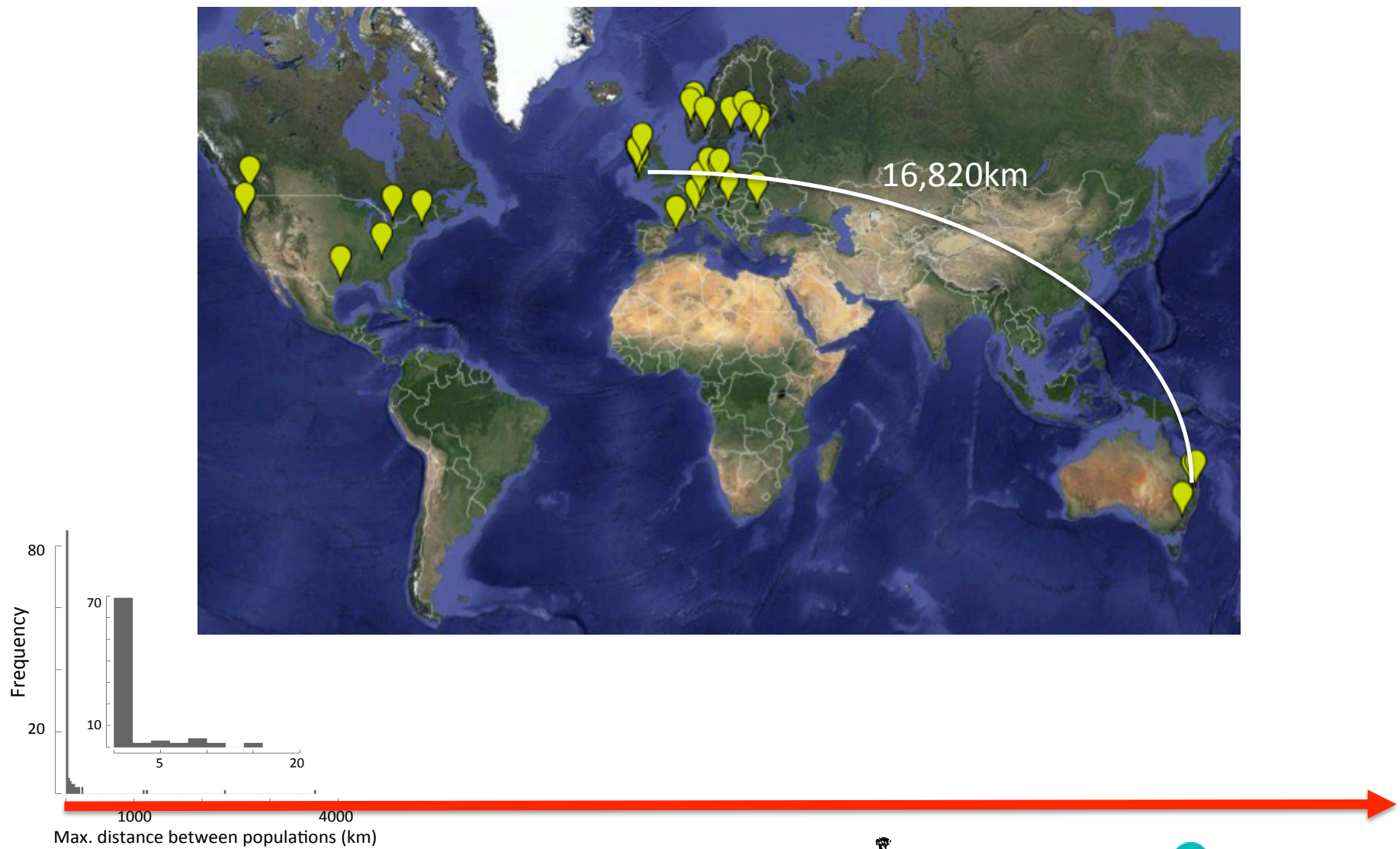




Multiple populations  
over large spatial  
extents are rarely  
studied



Mean distance between populations for  
112 species in COMPADRE

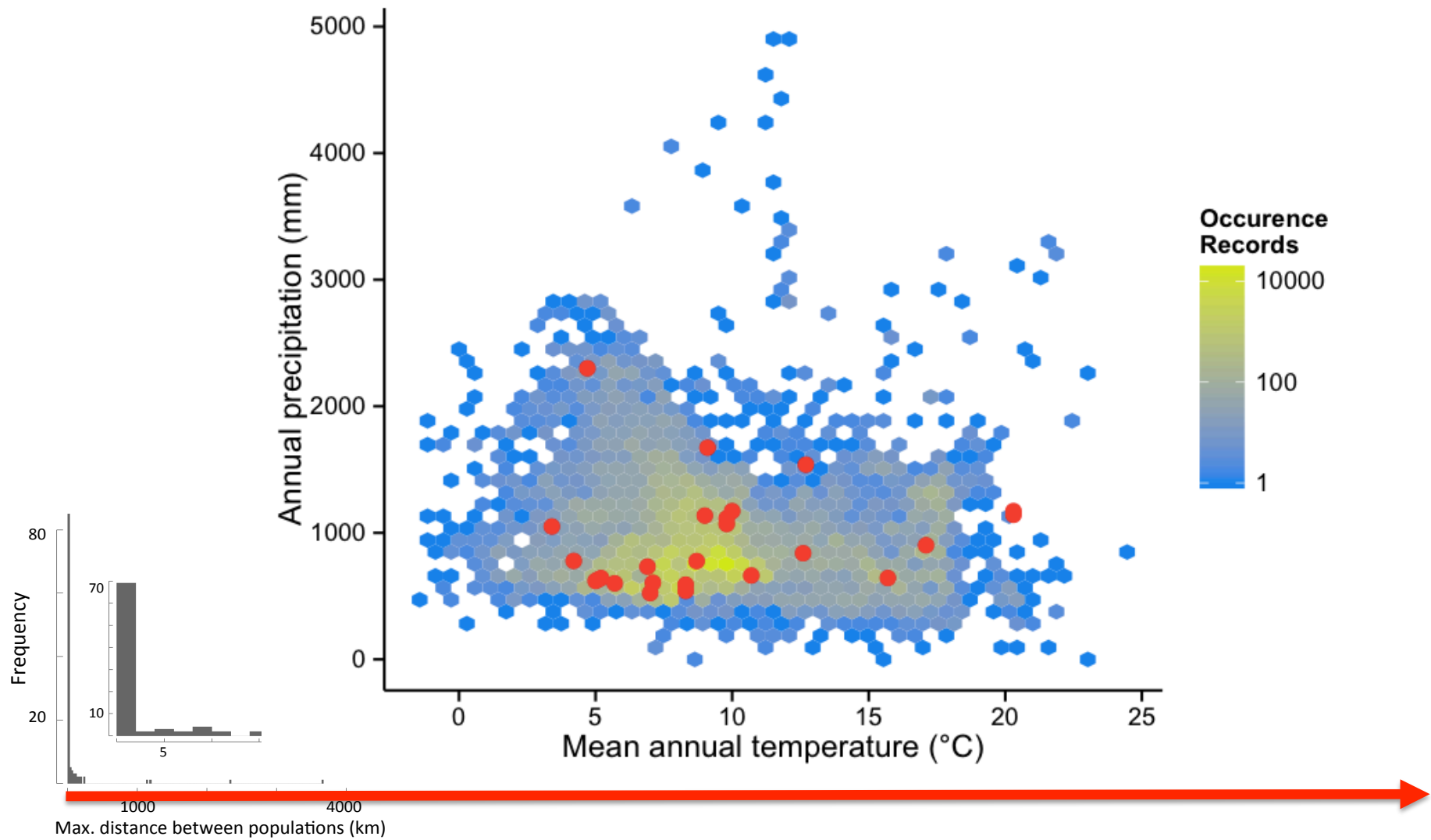


PLANT  
POP  
NET

[www.plantpopnet.com](http://www.plantpopnet.com)



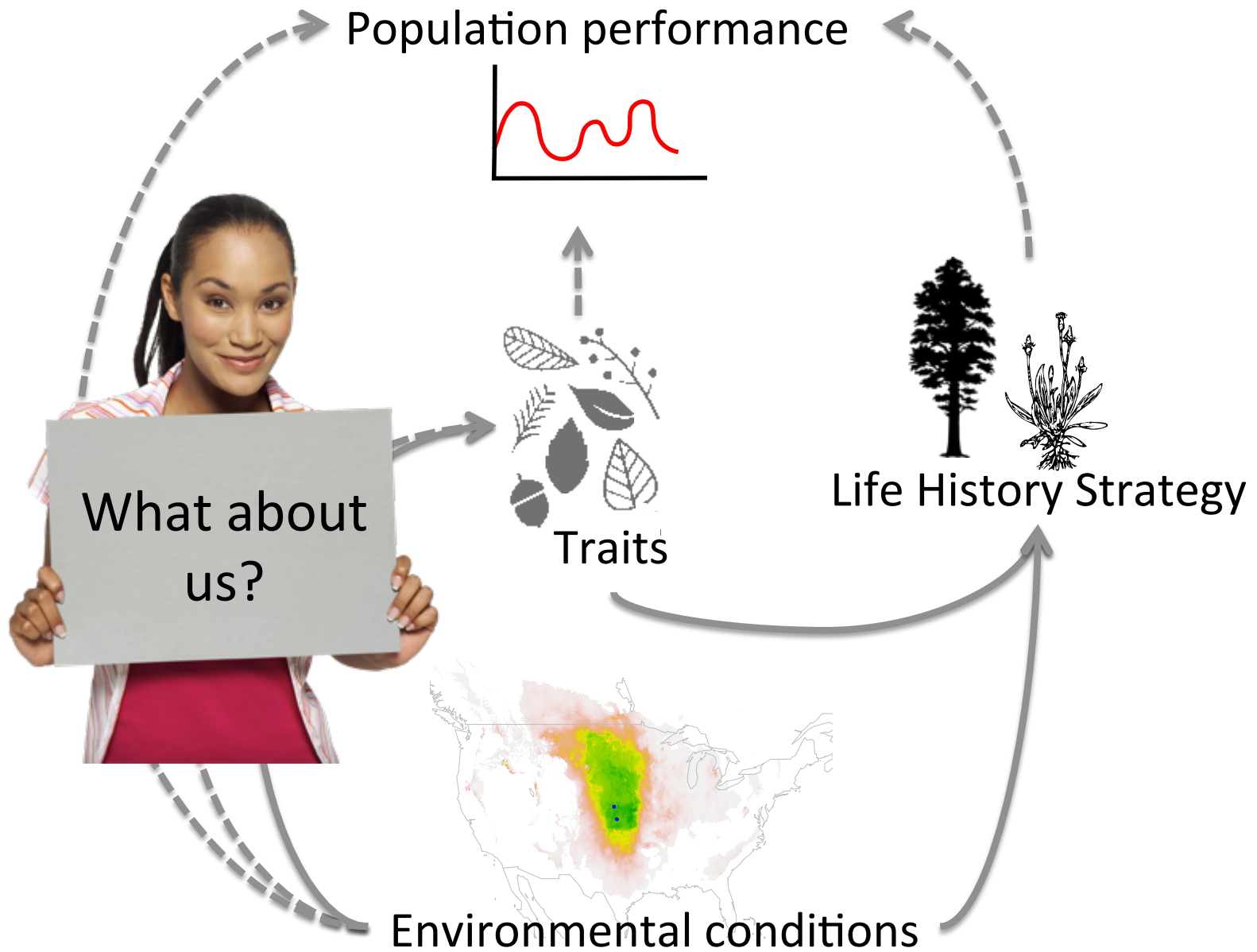
Science  
Foundation  
Ireland **sfi**  
For what's next



[www.plantpopnet.com](http://www.plantpopnet.com)

16,820km





# Landscapes of the future



Understanding & managing novel ecosystems



## **Movement, impacts and management of plant distributions in response to climate change: insights from invasions**

Caplat *et al.* 2013

# The Origins debate...



A forester engages in efforts to eradicate the velvet tree *Miconia calvescens* in Hawaii.

## Don't judge species on their origins

Davis et al. 2013  
*Nature*

Conservationists should assess organisms on environmental impact rather than on whether they are natives, argue Mark Davis and 18 other ecologists.

# The Origins debate...



## WORLD VIEW

*A personal take on events*

PHIL ROBERTS



### The Anthropocene could raise biological diversity

Humanity has wrought an age of ecological transformations. *It is time to rethink our irrational dislike of invading species, argues Chris D. Thomas.*

### on their origins

Conservationists should assess organisms on environmental impact rather than on whether they are natives, argue Mark Davis and 18 other ecologists.



# The Origins debate...



## WORLD VIEW

*A personal take on events*

PHIL ROBERTS



**The A**

*Diversity and Distributions, (Diversity Distrib.) (2013) 19, 1461–1467*

EDITORIAL



## Misleading criticisms of invasion science: a field guide

David M. Richardson<sup>1\*</sup> and Anthony Ricciardi<sup>2</sup>

on their origins

CHRIS D. Thomas.

Conservationists should assess organisms on environmental impact rather than on whether they are natives, argue Mark Davis and 18 other ecologists.

# The Origins debate...



## WORLD VIEW

PHIL ROBERTS



T

Diversity and Distributions, (Diversity and Distributions)

Oikos 122: 1143–1146, 2013  
doi: 10.1111/j.1600-0706.2013.00445.x  
© 2013 The Authors. Oikos © 2013 Nordic Society Oikos  
Subject Editor: Dustin Marshall. Accepted 19 March 2013



## Another call for the end of invasion biology

Loïc Valéry, Hervé Fritz and Jean-Claude Lefeuvre

Chris D. Thomas.

Conservationists should assess organisms on environmental impact rather than on whether they are natives, argue Mark Davis and 18 other ecologists.

# The Origins debate...



**Oikos 122: 1143–1146, 2013**  
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Accepted 19 March 2013

## A call for an end to calls for the end of invasion biology

Daniel Simberloff and Jean R. S. Vitale



## Another call for the

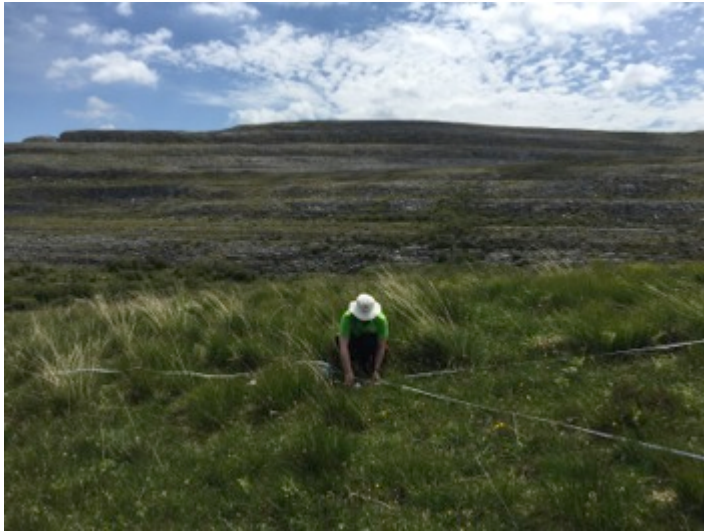
Loïc Valéry, Hervé Fritz and Jean-Claude Lefeuvre

## Their Origins

Conservationists should assess organisms on environmental impact rather than on whether they are natives, argue Mark Davis and 18 other ecologists.



# Does origin inform on ecology?



Slieve Carran, Ireland



Pinjarra Hills, Australia

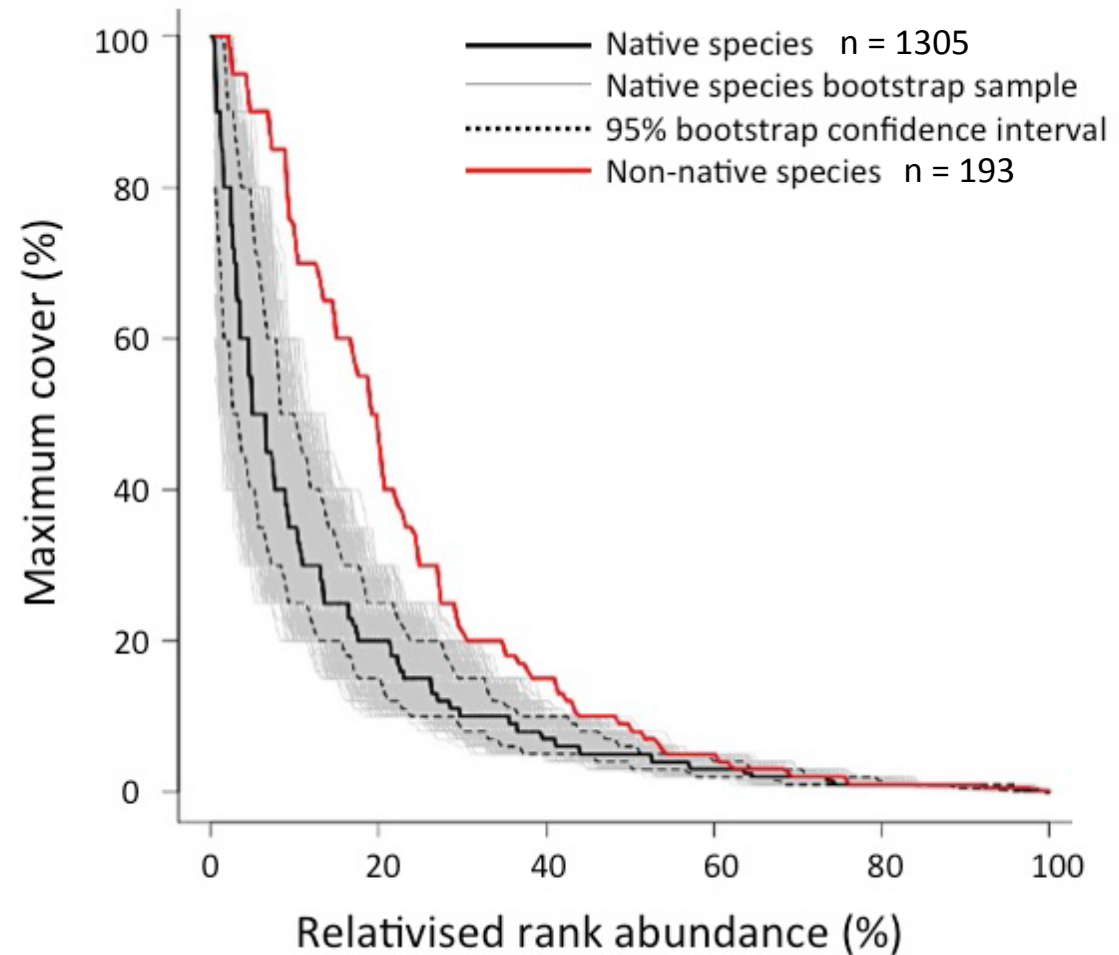


Burrawan, Australia



nutrient network

Non-native species are more abundant than native species – **64 grassland sites in 13 countries**



Seabloom, Borer, Buckley et al.  
2015 Nature Communications



Non-natives are more abundant BUT they are equally  
abundant in their native range



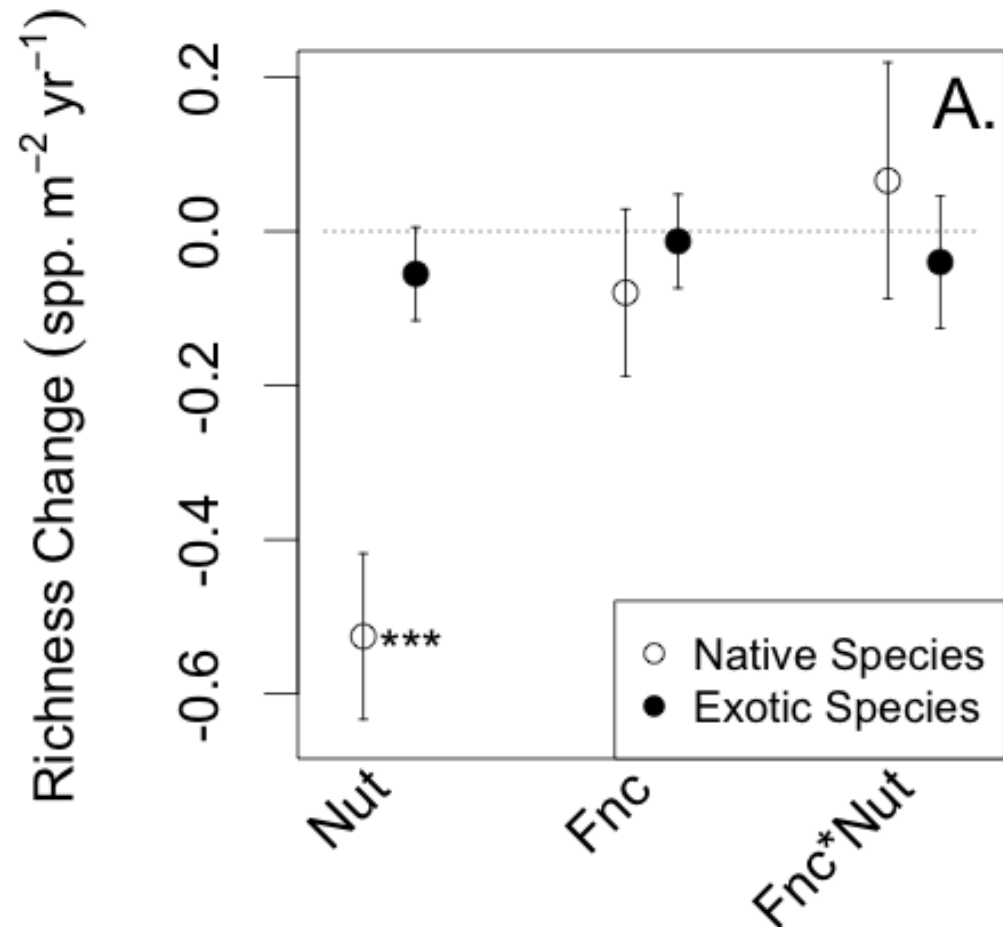
Firn et al. 2011 Ecology Letters

26 spp., 39 sites, 8 countries

Non-natives are a biased sample of native  
species pool

In fertilised grasslands:

- native species richness declines, non-native species richness stays the same
- Non-native abundance increases



# The Origins debate...



122: 1143–1146, 2013  
106.2013.00445.x  
Oikos

100  
YEARS

Journal of Ecology



British Ecological Society

*Journal of Ecology* 2016, **104**, 4–17

doi: 10.1111/1365-2745.12501

## Does the biogeographic origin of species matter? Ecological effects of native and non-native species and the use of origin to guide management

Yvonne M. Buckley<sup>1,2\*</sup> and Jane Catford<sup>3,4,5</sup>

Another call for

Loïc Valéry, Hervé Fritz and Jean-Claude Lefeuvre

their origin

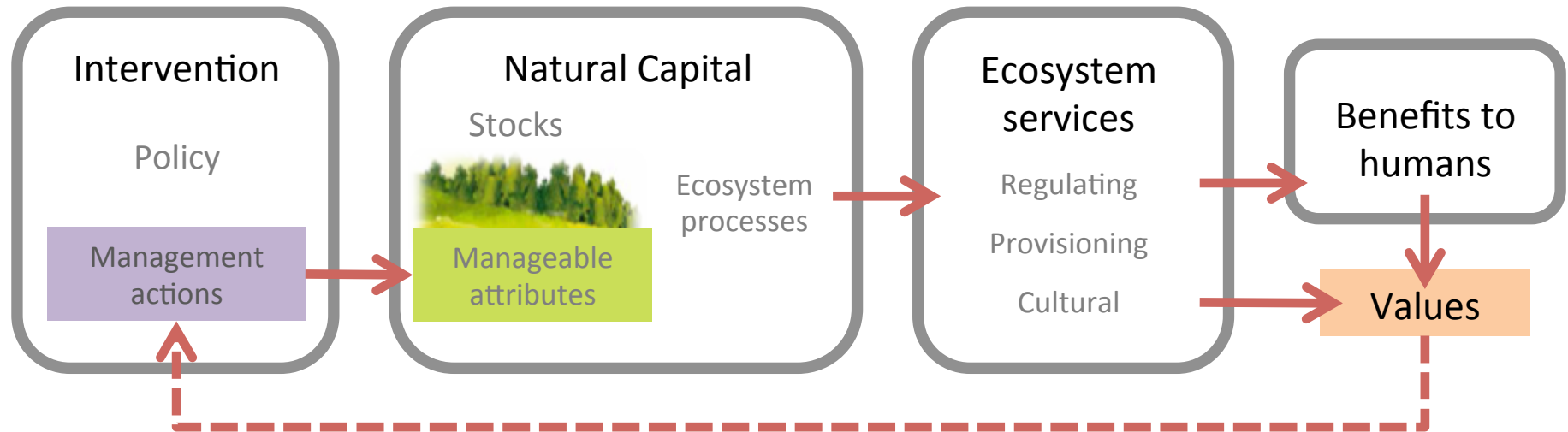
Conservationists should assess organisms on environmental impact rather than on whether they are natives, argue Mark Davis and 18 other ecologists.

To understand the landscapes of the future we can't ignore  
the dominant species & critical ecosystem engineer -  
humans



Buckley & Catford 2016, Journal of Ecology  
(Harper Review)

# Better management of natural capital under global change





# Thanks

Many collaborators & co-authors including:

## Post-docs:

Paul Caplat, Iadine Chadès, Shaun Coutts, Anna Csergő, Jennifer Firn, Rob Salguero Gómez

## Students:

Fleur Maseyk, Yi Han, Natalie Kerr

## Research assistant:

Alain Finn

## Collaborators:

Eric Seabloom, Elizabeth Borer, Antoine Guisan, Jane Catford

## Images:

Viv Buckley, Kevin Healy

## Find out more:

Open data on plant and  
animal life histories:

[www.compadre-db.org](http://www.compadre-db.org)

Environmental effects on  
population dynamics:

PLANTPOPNET

[www.plantpopnet.com](http://www.plantpopnet.com)

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