

Taking account of biodiversity and ecological assessment tools within the oil-palm landscape

Jake L Snaddon

Biodiversity Institute, University of Oxford





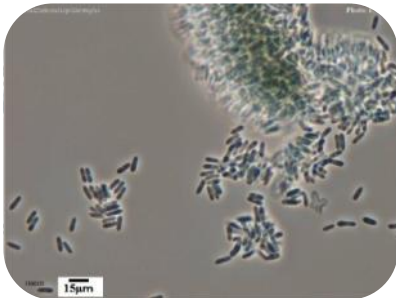
Talk outline

1. Biodiversity and changes in the oil palm landscape
2. The environmental concerns these changes cause
3. Tools for assessing ecological value

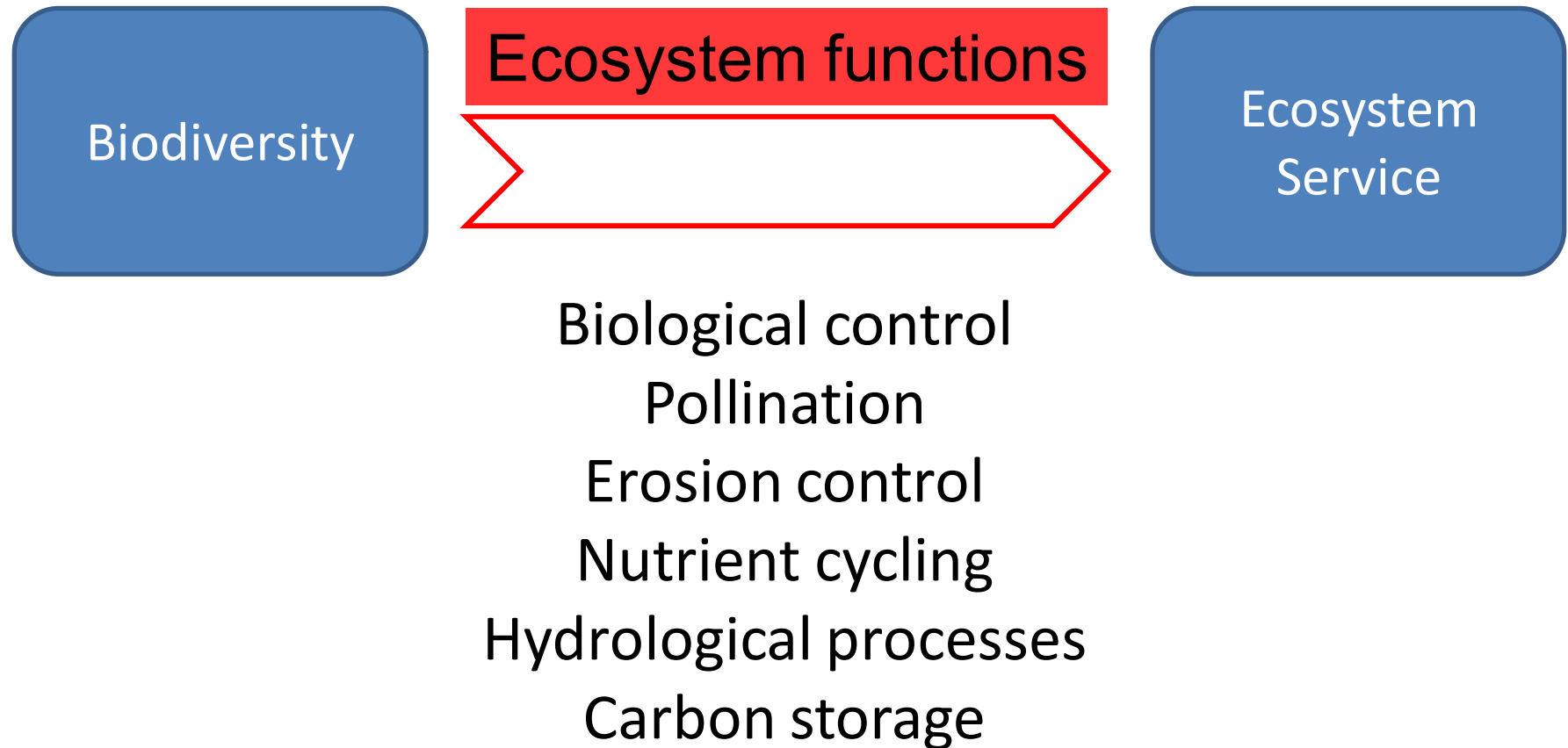
High Conservation Value Biodiversity

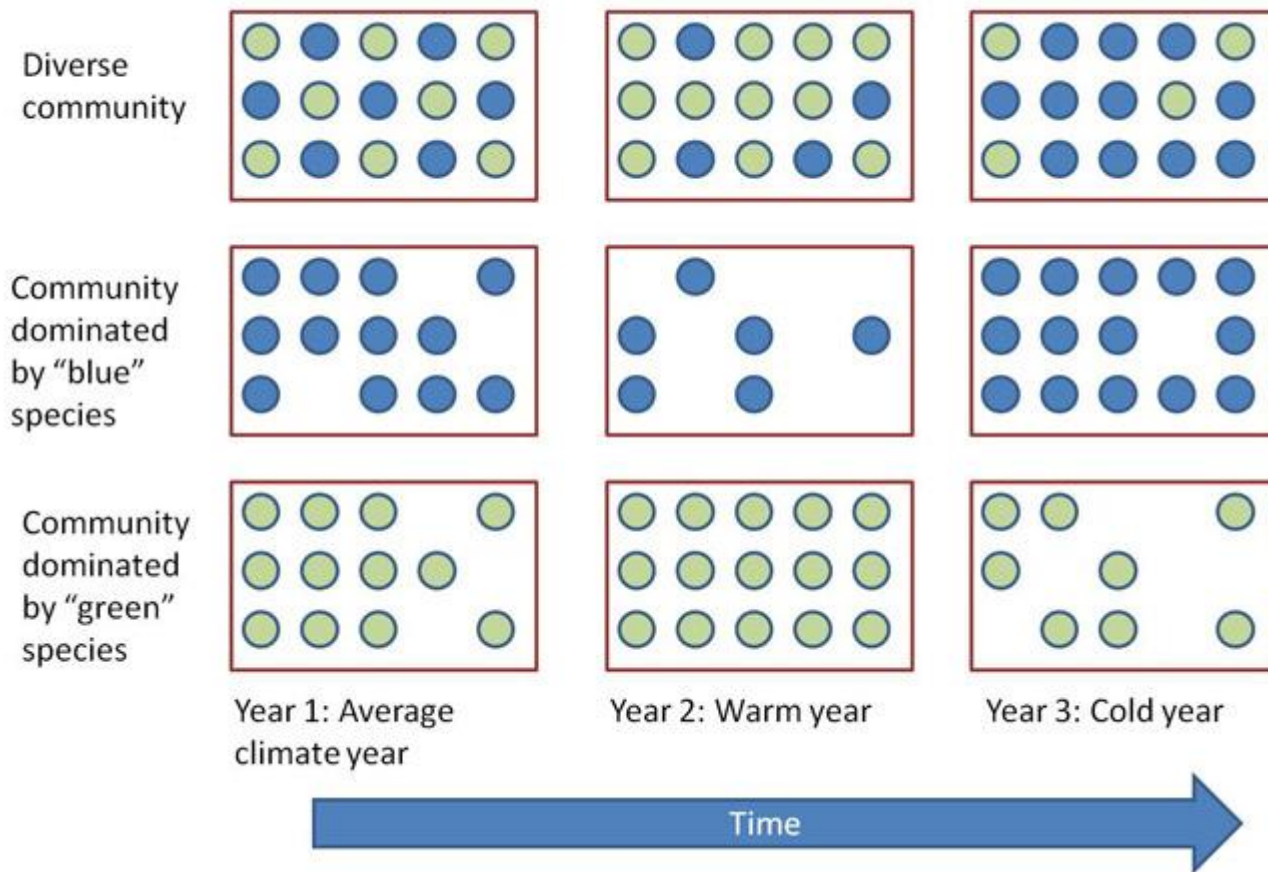


“Useful” Biodiversity



Links between biodiversity and ecosystem services





Landscape and habitat complexity supports biodiversity

Pristine Forest

↓ Forest conversion

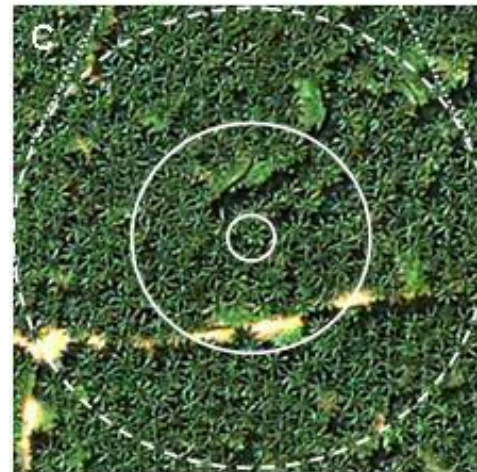
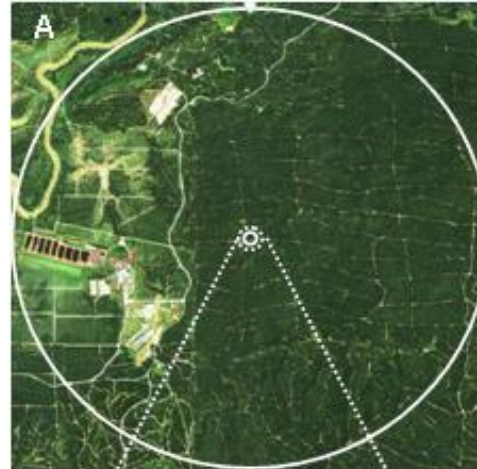
Complexity

Management
Practices

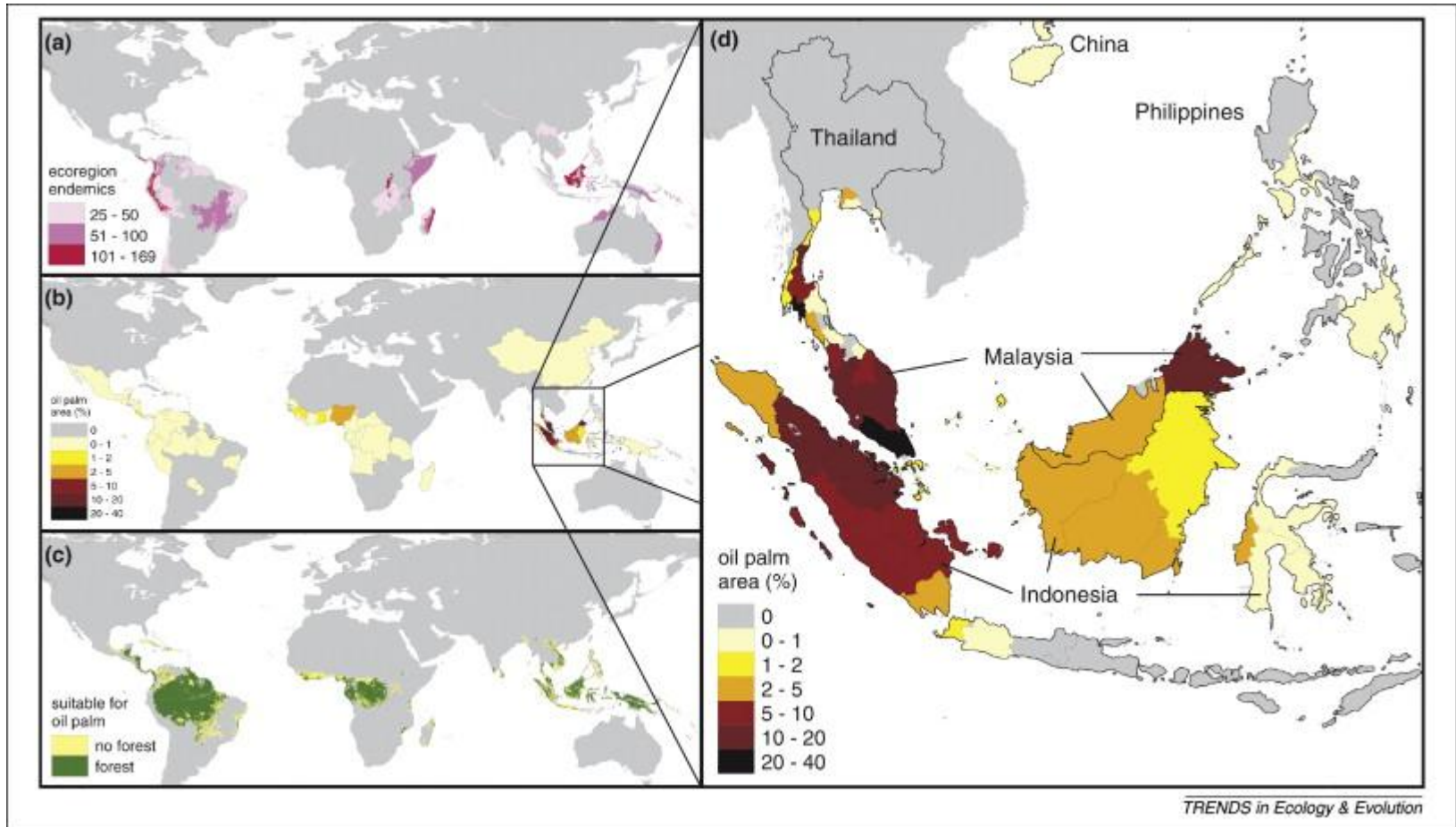
Biodiversity

Ecosystem
Services

Ecosystem
Function



Global oil palm landscape



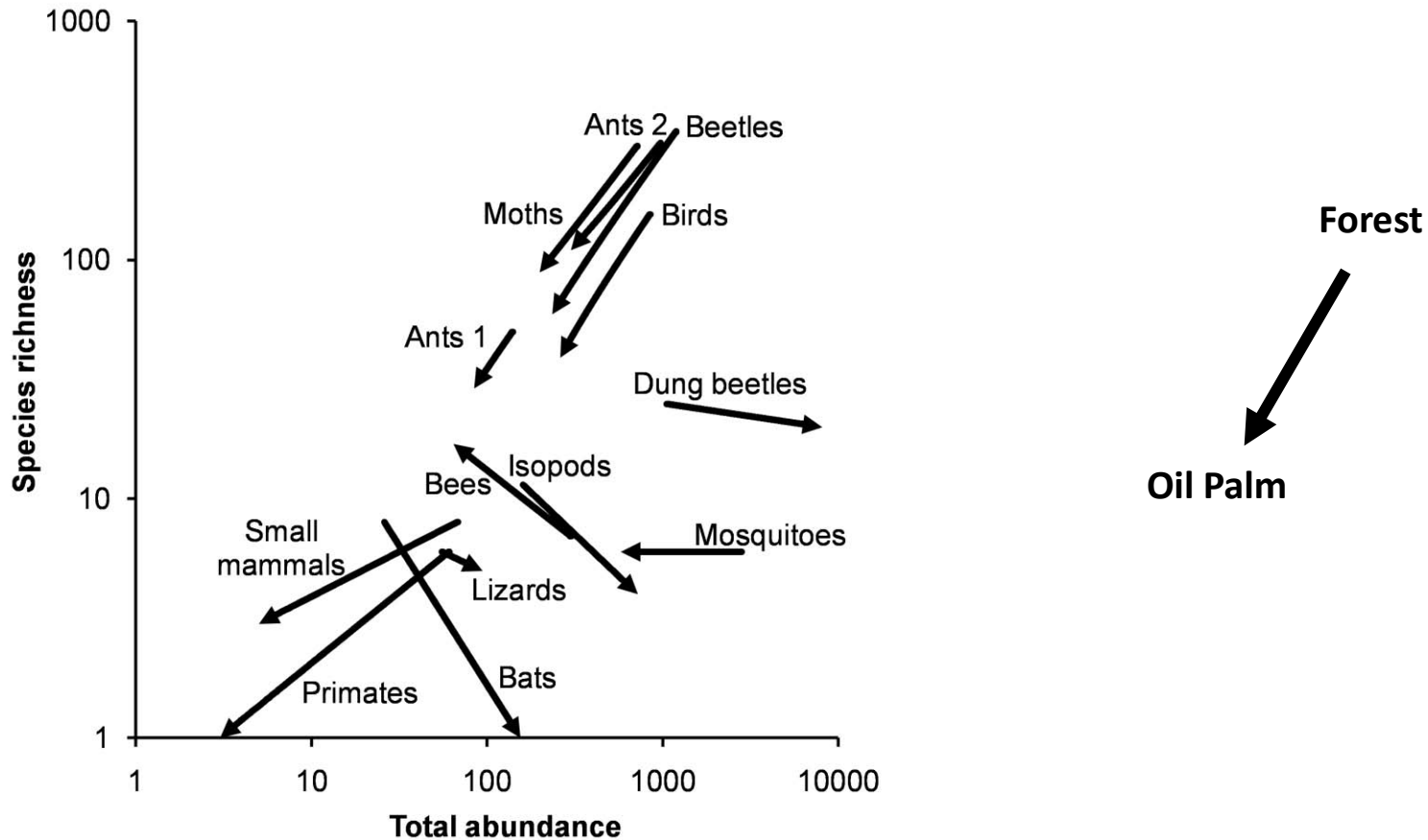
Fitzherbert *et al.* 2008 *TREE*



The concerns

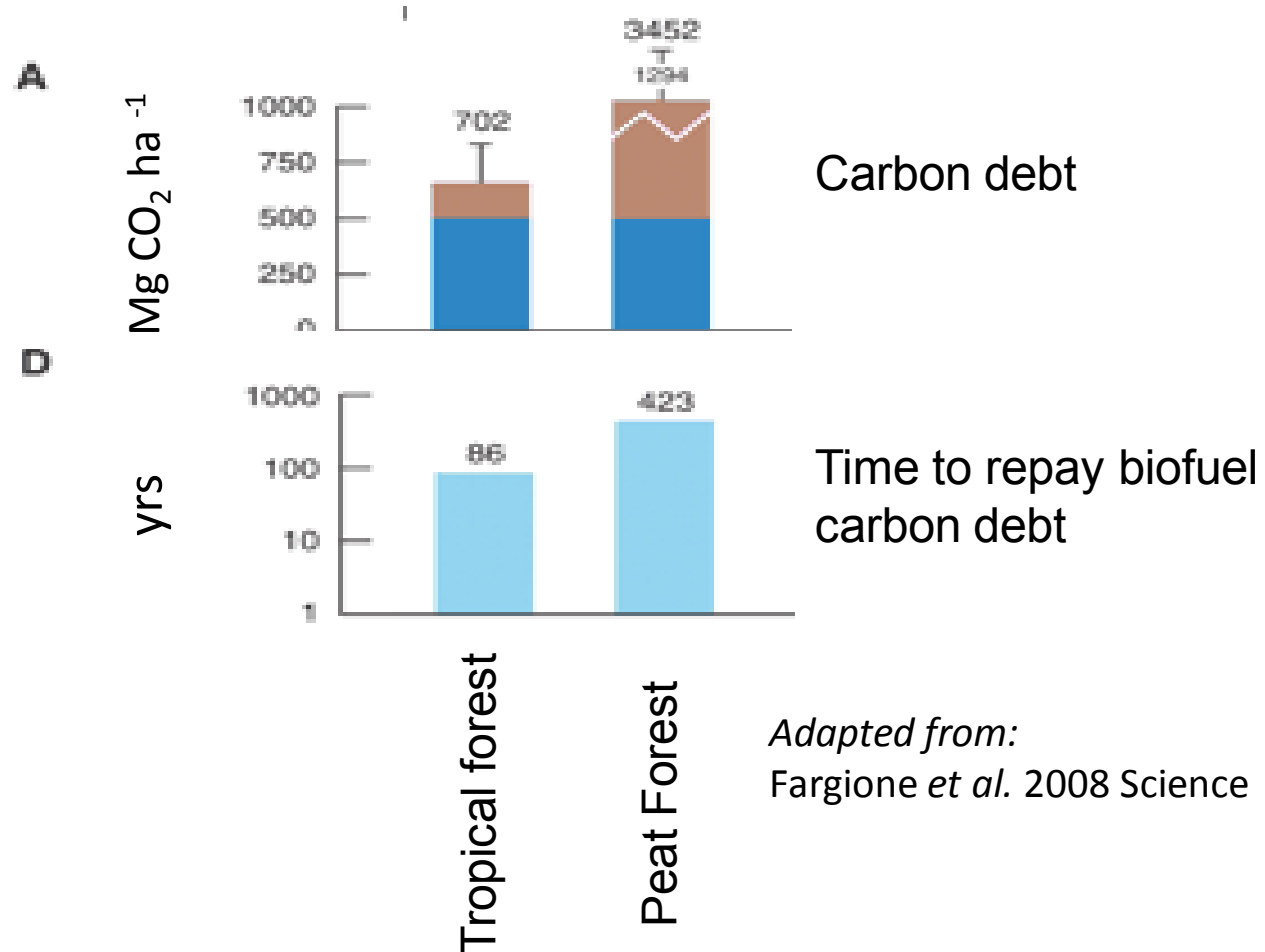
1. Biodiversity loss
2. Carbon emissions
3. Deforestation

Effects on biodiversity: richness and abundance

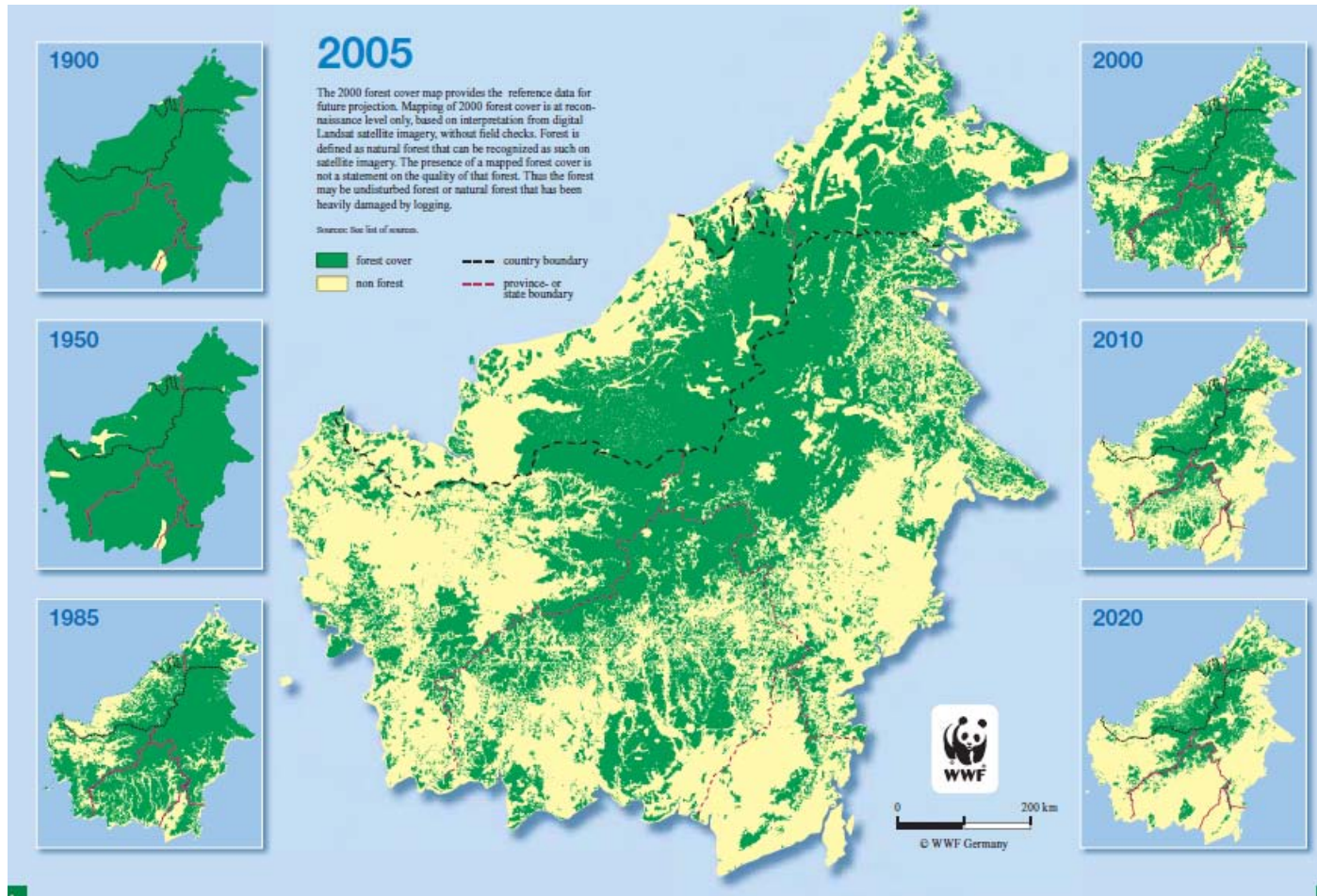


Foster, Snaddon *et al.* 2011 Phil. Trans.

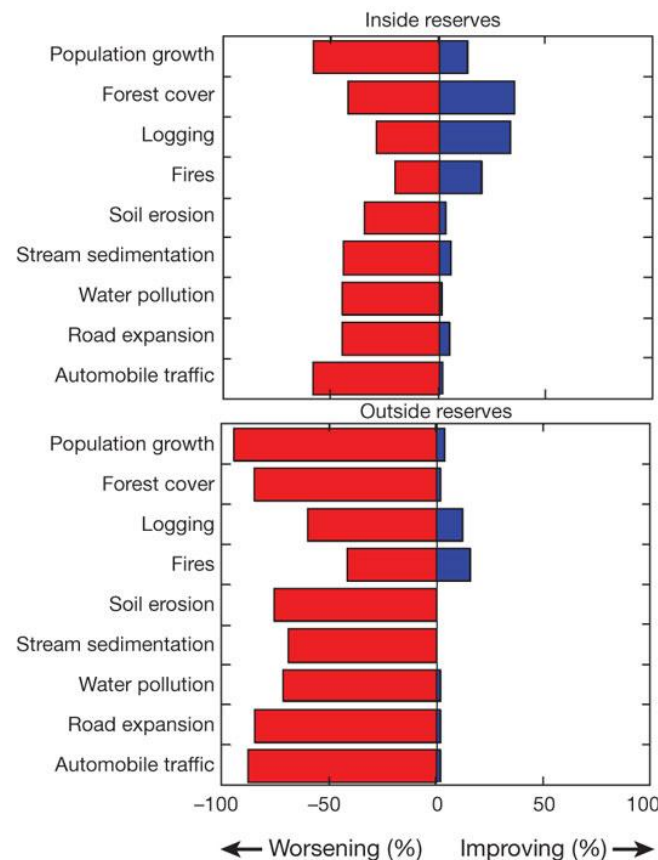
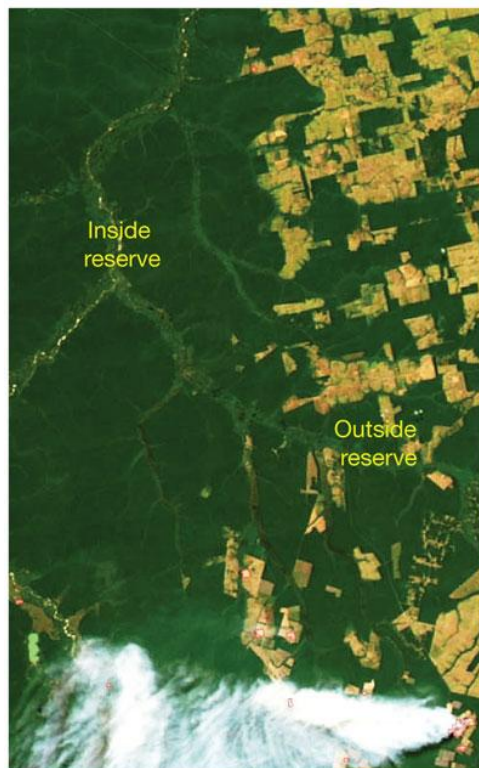
Carbon debt – oil palm grown on:



Deforestation



Ecological changes inside versus outside protected areas.



Inside

Outside

Laurance *et al.* *Nature* 2012



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Oil palm land use in Malaysia

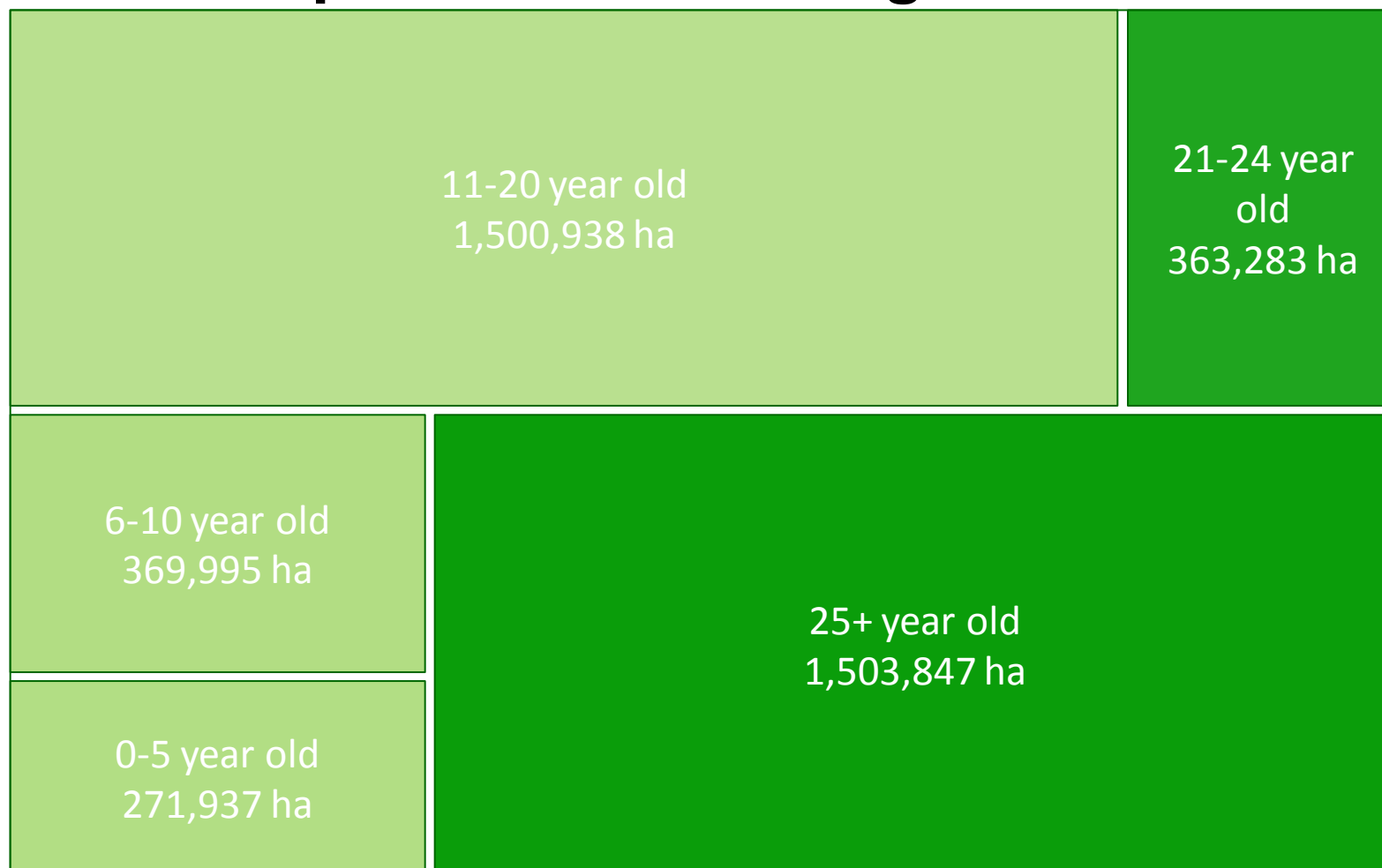


Area of oil palm in Malaysia 2012

4,010,000 ha

estimated from FAO data

Area of oil palm of different age classes in 2012



estimated from FAO data

Area of oil palm of different age classes in 2012

- Large area of mature oil palm
- Replanting sustainable production on land is essential
- Managing biological integrity to support production

21-24 year
old
363,283 ha

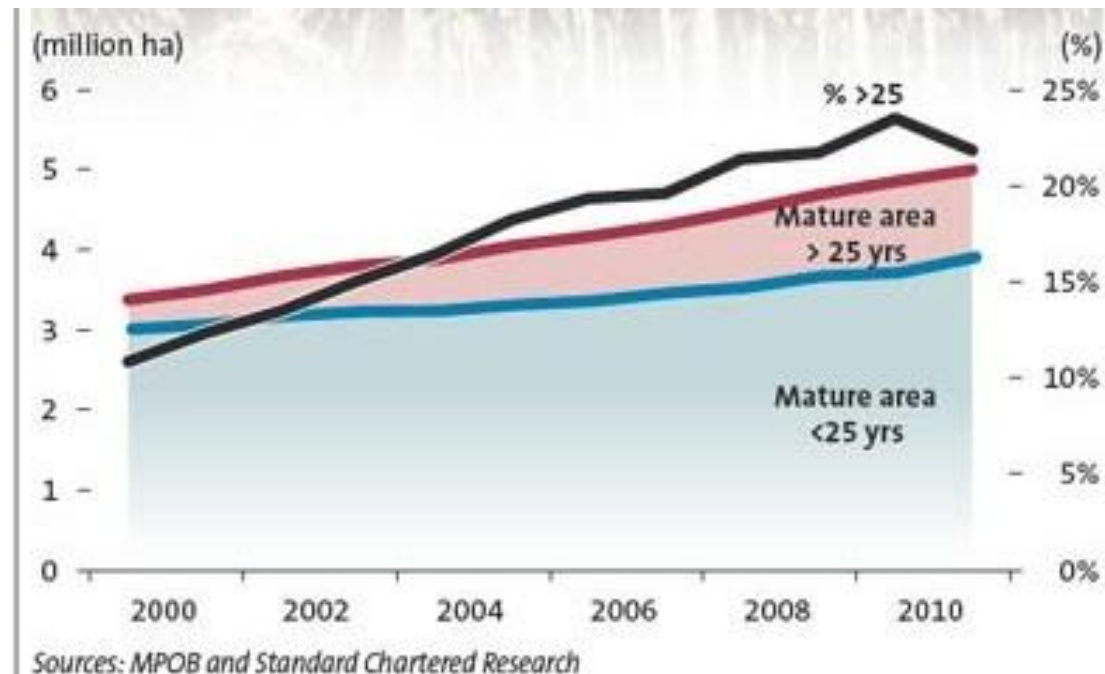
25+ year old
1,503,847 ha

estimated from FAO data

Ageing oil palm plantations likely to lift CPO price

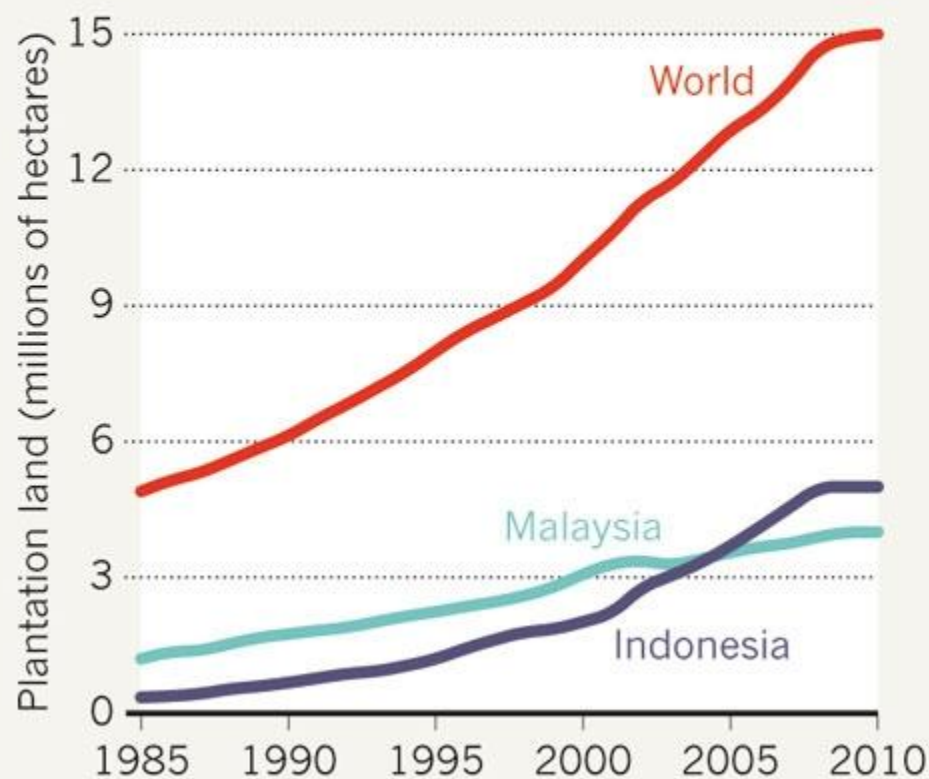
The Star May 9th 2012

Profile of oil palm in Malaysia



PALM SPROUTS

More than half of the world's palm-oil plants are farmed in Malaysia and Indonesia.



Nature 2012

Two areas of change

Forest - oil palm conversion

- Maintenance of forest areas
- “*Sustainable*” expansion
- Protection of High Conservation Value Areas



Oil palm replanting

- Maintenance / increase in yield on existing area
- Maintenance of biological and agronomical functions
- Minimise pest and diseases





How can we balance:

- the ***time and expertise required to collect biological and ecological data***
and
- the need for **high quality, user-friendly, cost effective information?**

High Conservation Value Assessment

- Highlights areas of specific interest
- Difficulties in interpreting and implementing HCV
- Criteria need to be comparable between different areas
- Is time consuming





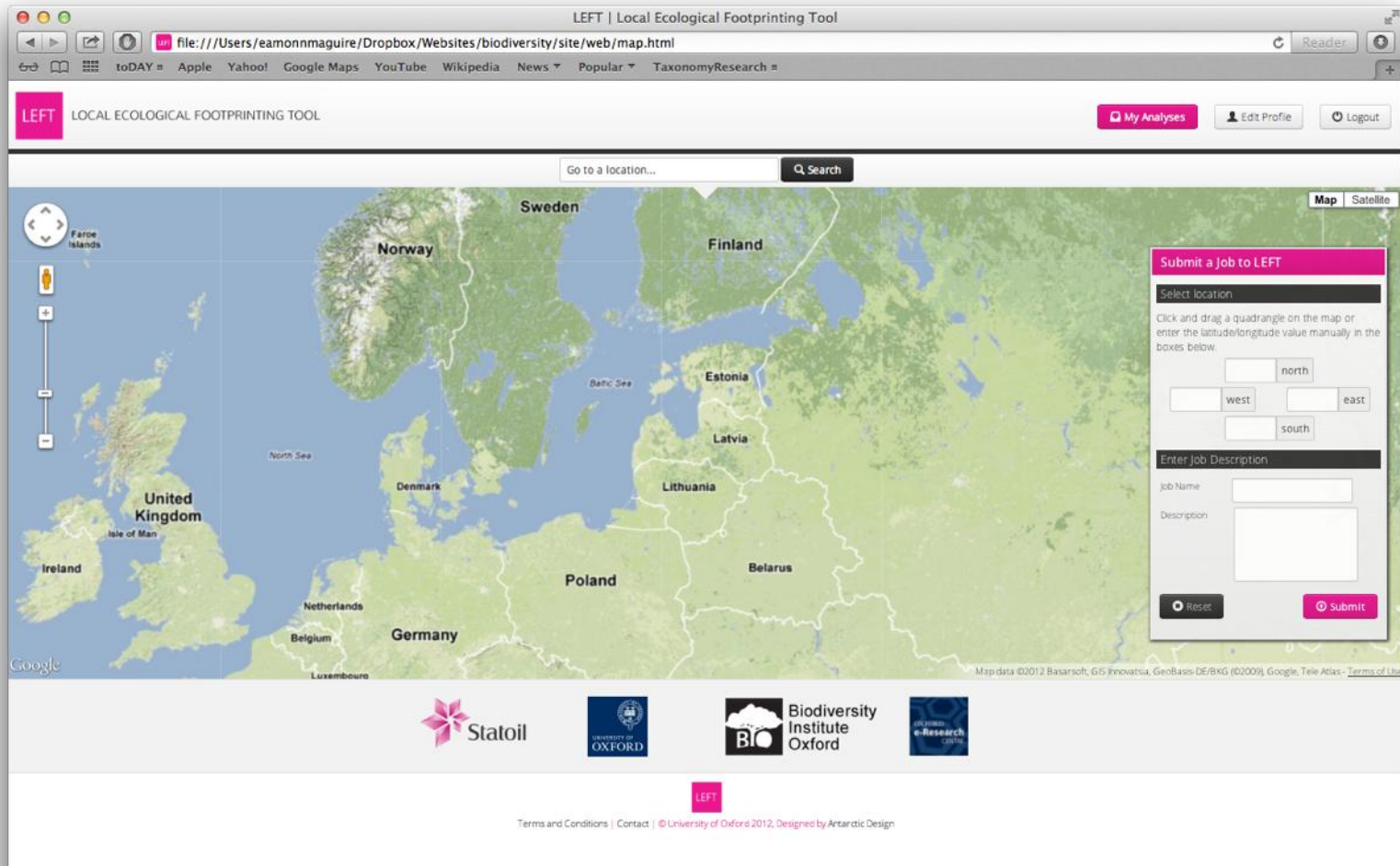
Use automated ecological footprinting tools

One such tool is:

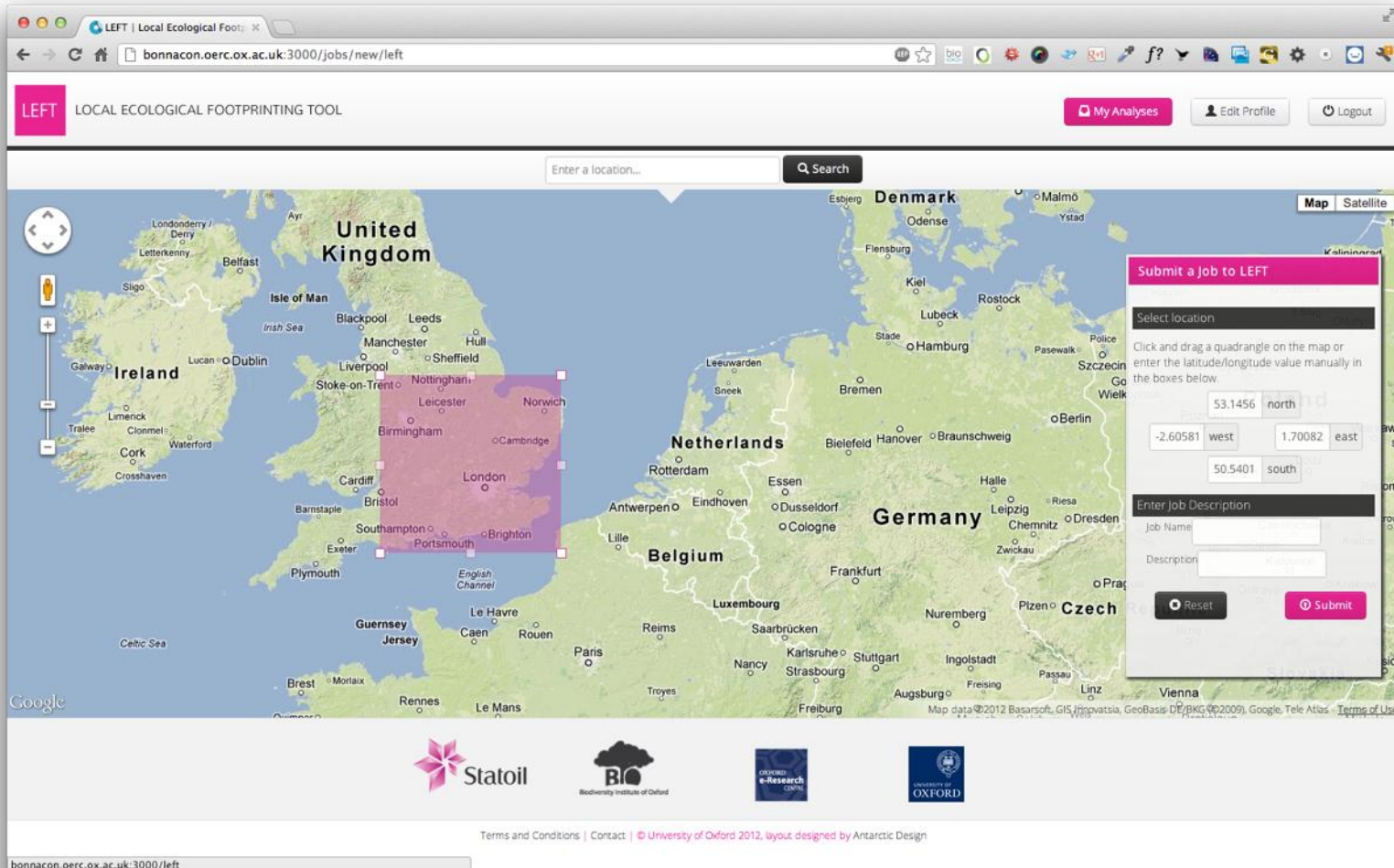
LEFT (Local Ecological Footprinting Tool)

- Particularly useful as land use planning tools
- Input land parcel location: co-ordinates (latitude and longitude)
- Get a assessment output as a series of maps indicating ecological value across the landscape, with a 24hr period.

LEFT (Local Ecological Footprinting Tool)



LEFT (Local Ecological Footprinting Tool)



LEFT LOCAL ECOLOGICAL FOOTPRINTING TOOL

My Analyses Edit Profile Logout

Enter a location... Search

Submit a Job to LEFT

Select location

Click and drag a quadrangle on the map or enter the latitude/longitude value manually in the boxes below.

53.1456 north
-2.60581 west 1.70082 east
50.5401 south

Enter Job Description

Job Name
Description

Reset Submit

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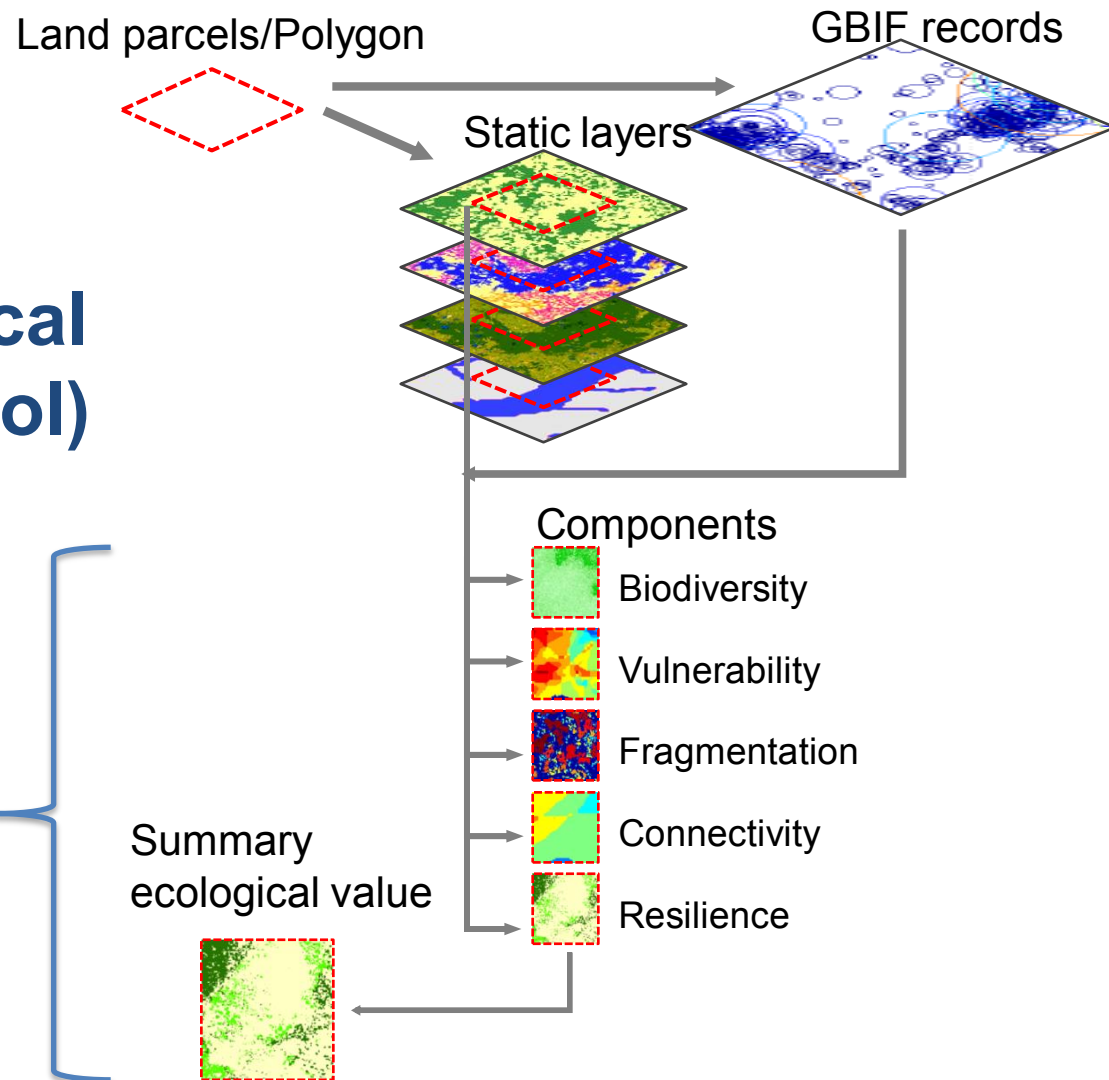
bonnacon.oerc.ox.ac.uk:3000/left

LEFT (Local Ecological Footprinting Tool)

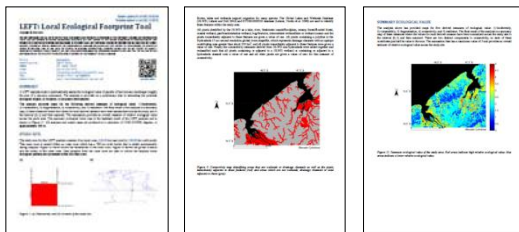
- The method uses existing **globally available web-based databases**
- Tested and **peer reviewed models and algorithms**
- Provides an **ecological score** based on **five key ecological features**:
 1. **Biodiversity**
 2. **Fragmentation**
 3. **Threat**
 4. **Connectivity**
 5. **Resilience**



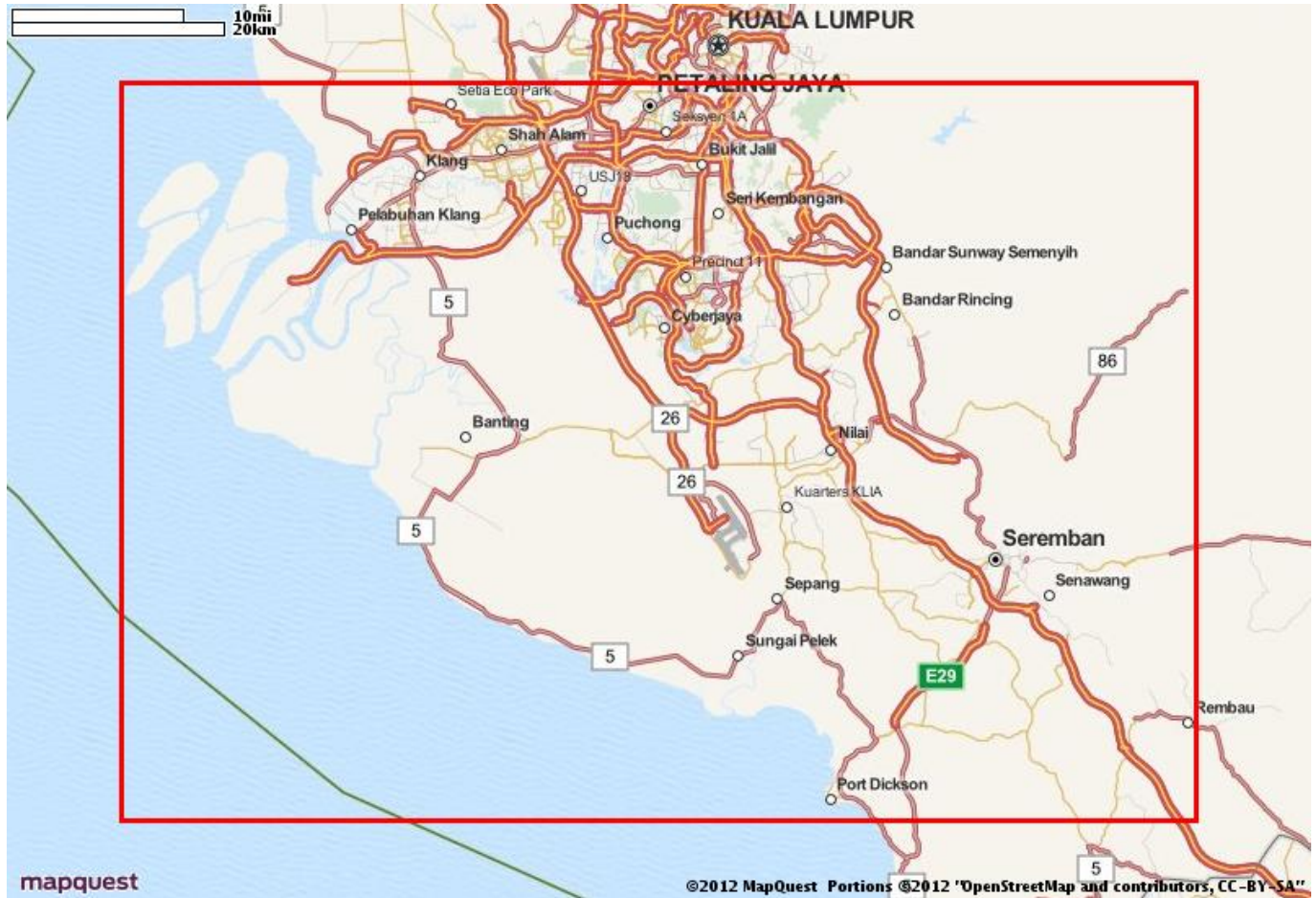
LEFT (Local Ecological Footprinting Tool)



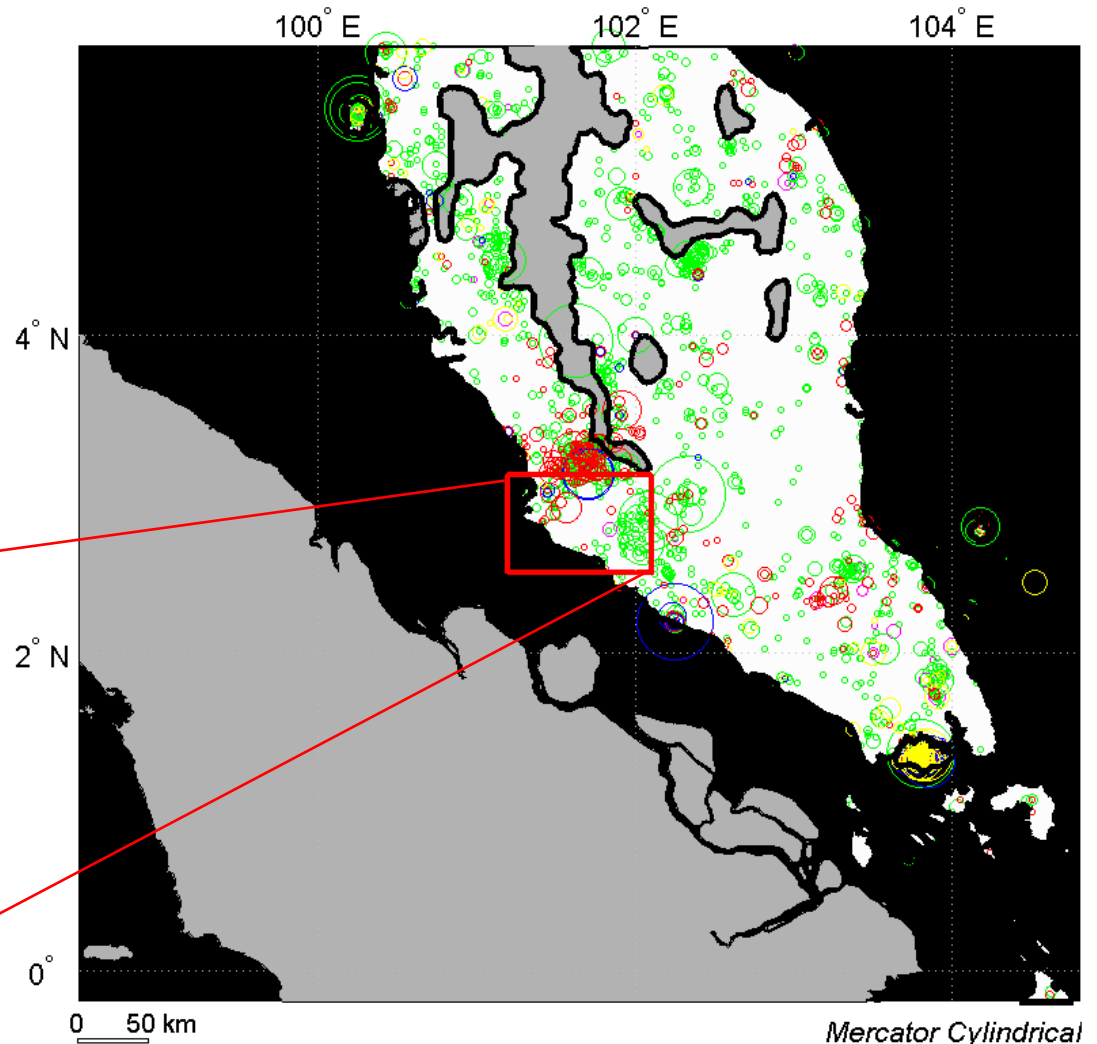
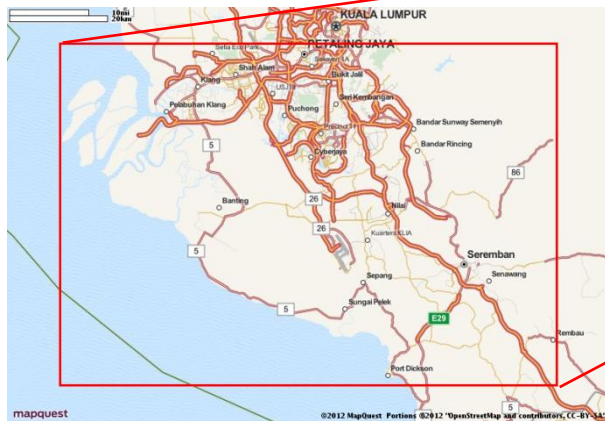
Output report



Putrajaya



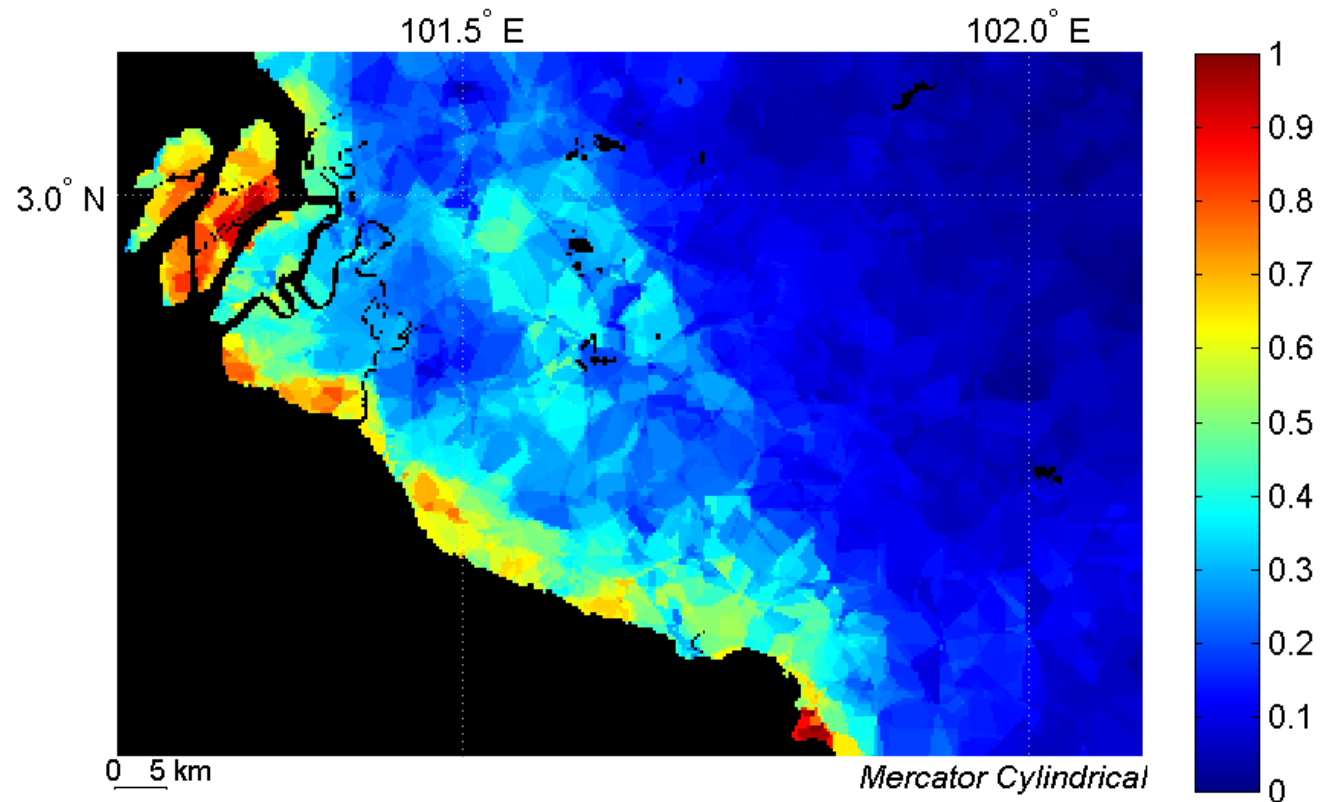
Biodiversity



Biodiversity

Beta diversity

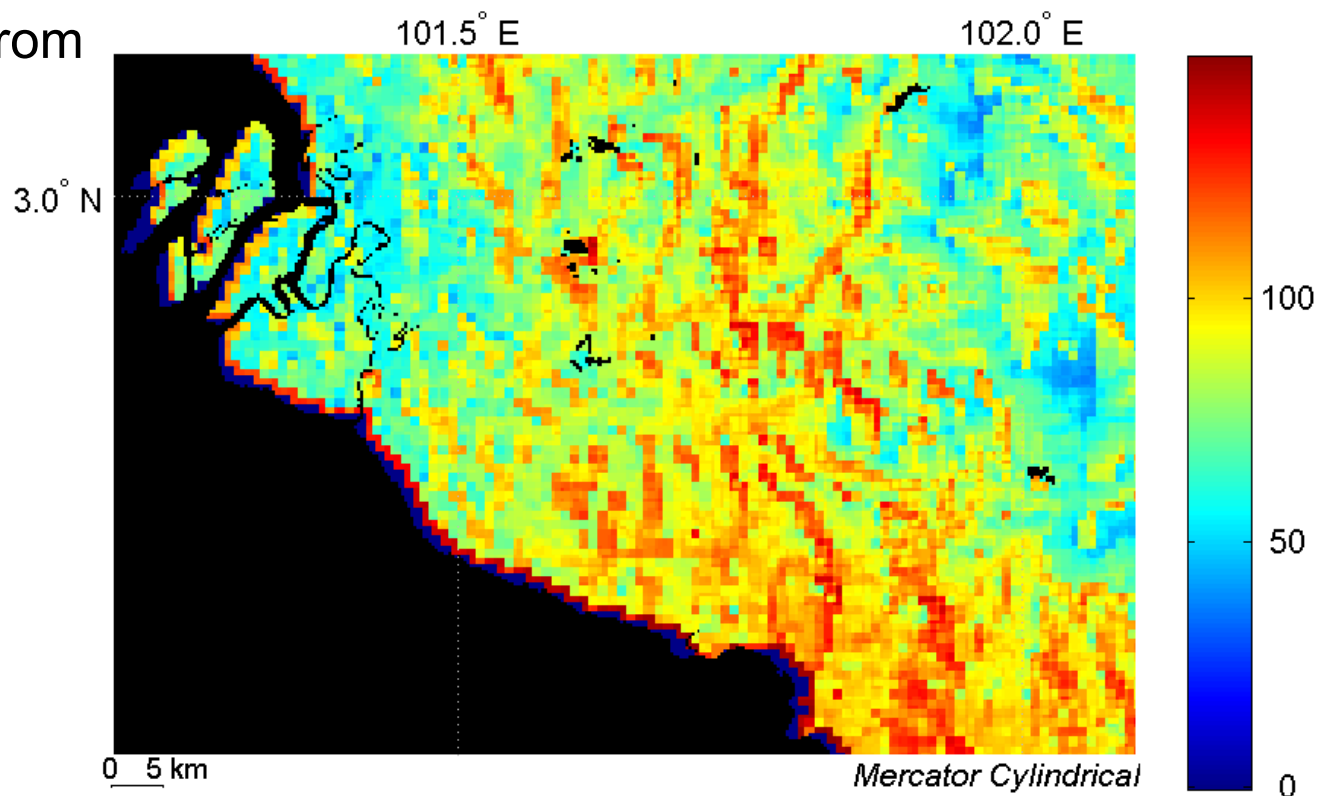
*Distance weighted
average
composition
dissimilarity
between all sites*



Vulnerability

Map of vulnerable species distributions from IUCN Red Data List

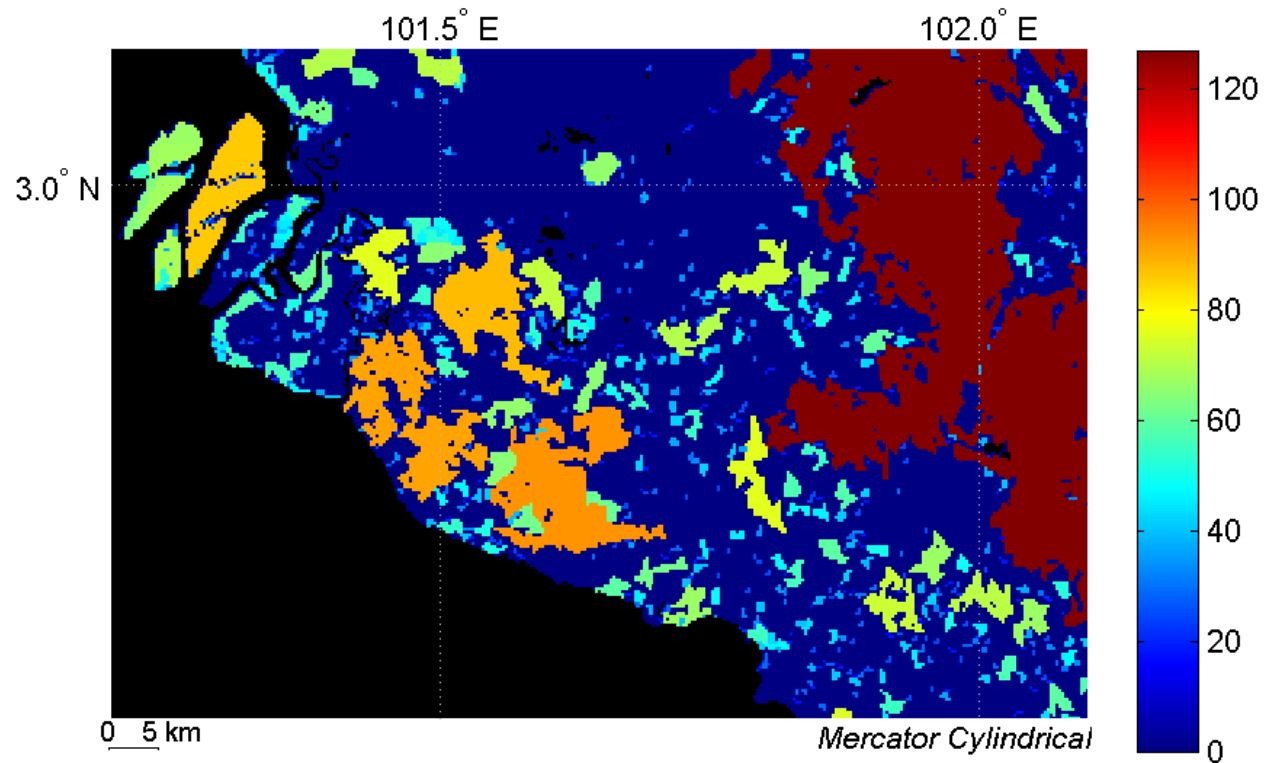
- Reptiles
- Mammals
- Amphibians
- And Birds



Fragmentation

Using GlobCover
vegetation data

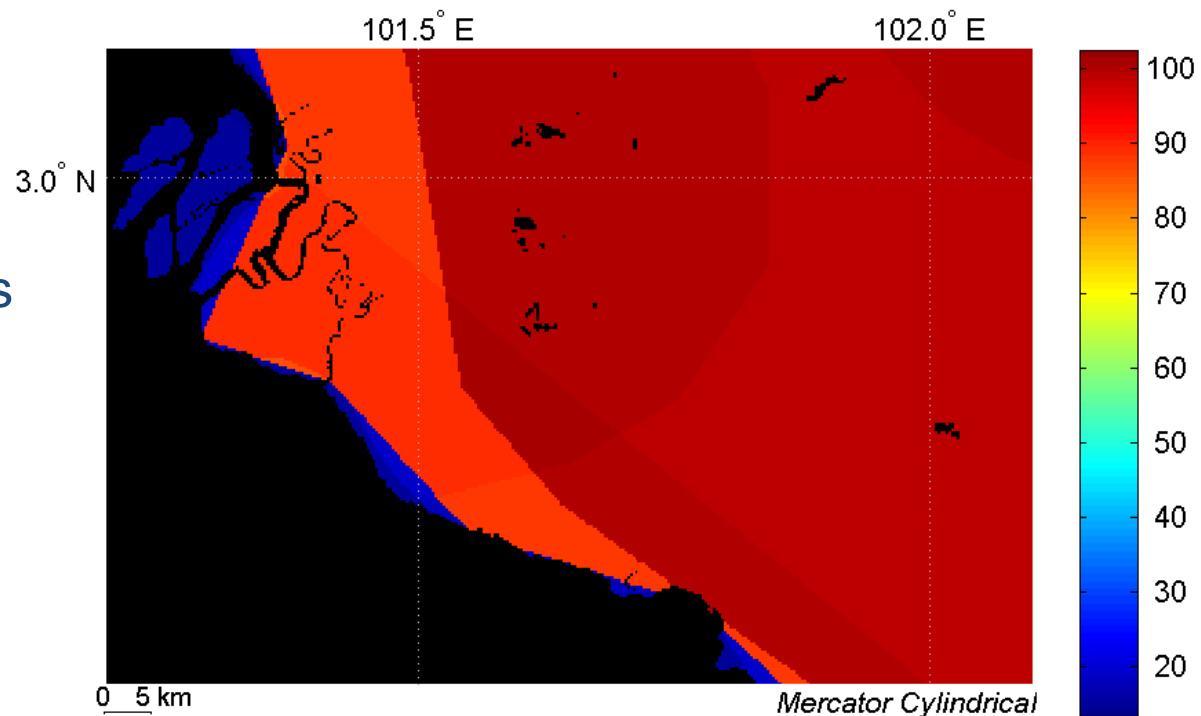
Patch sizes are
assigned scores



Connectivity

Connectivity map for migratory species

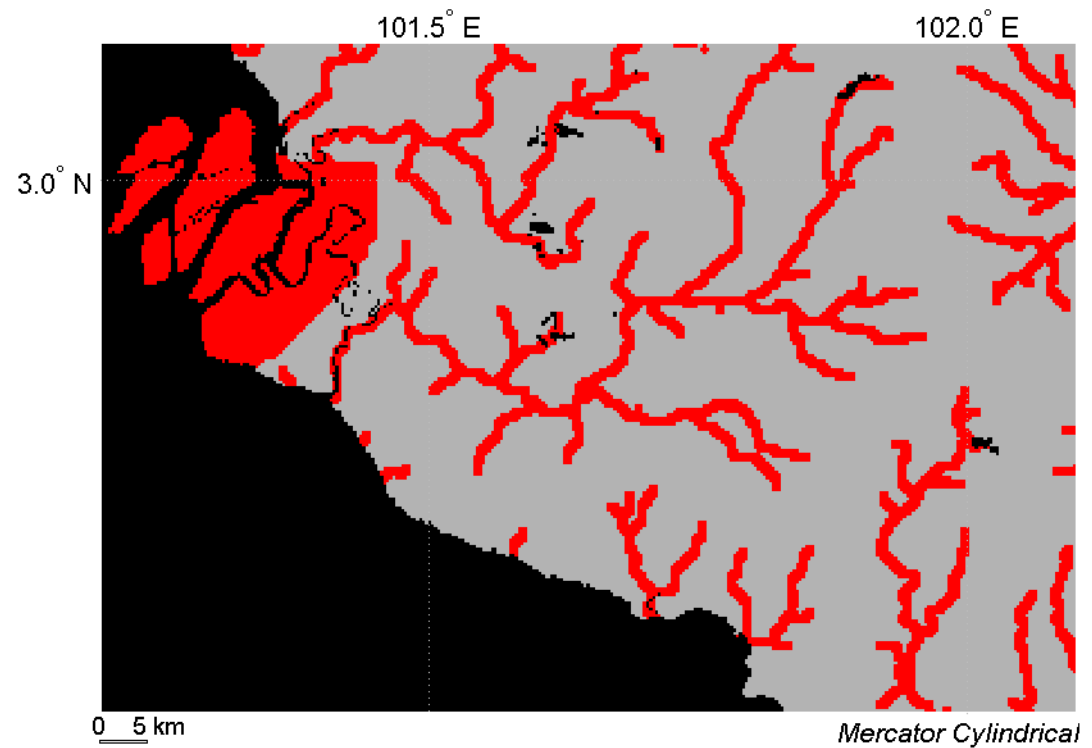
- Birds
- Terrestrial mammals
- Turtles





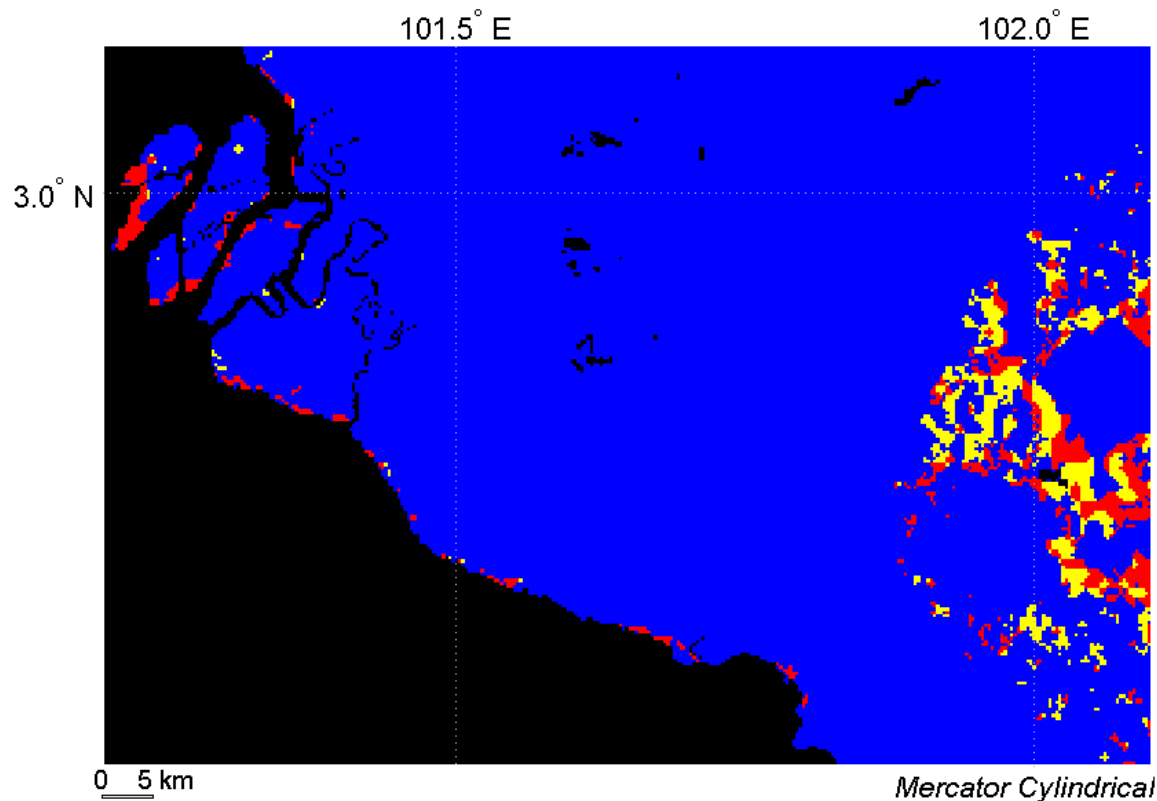
Connectivity

Map identifies areas of wetland and drainage channels



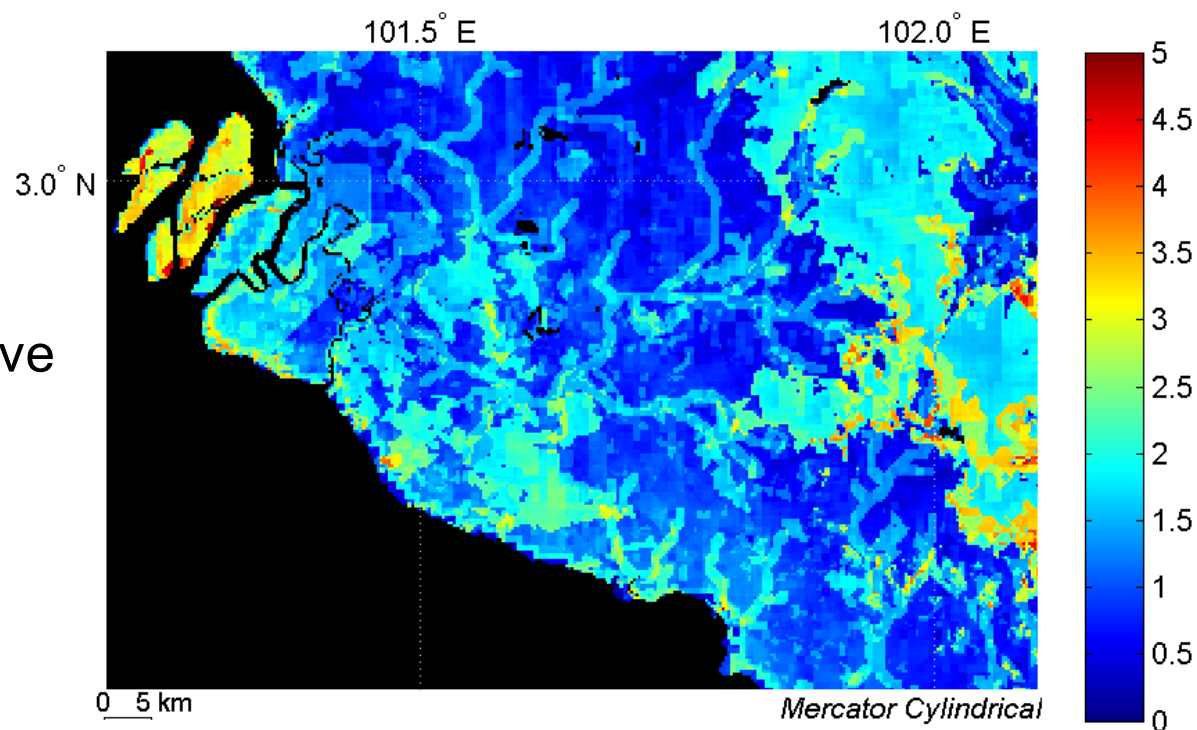
Resilience

Map identifies
relationship between
net primary productivity
(NPP) and precipitation

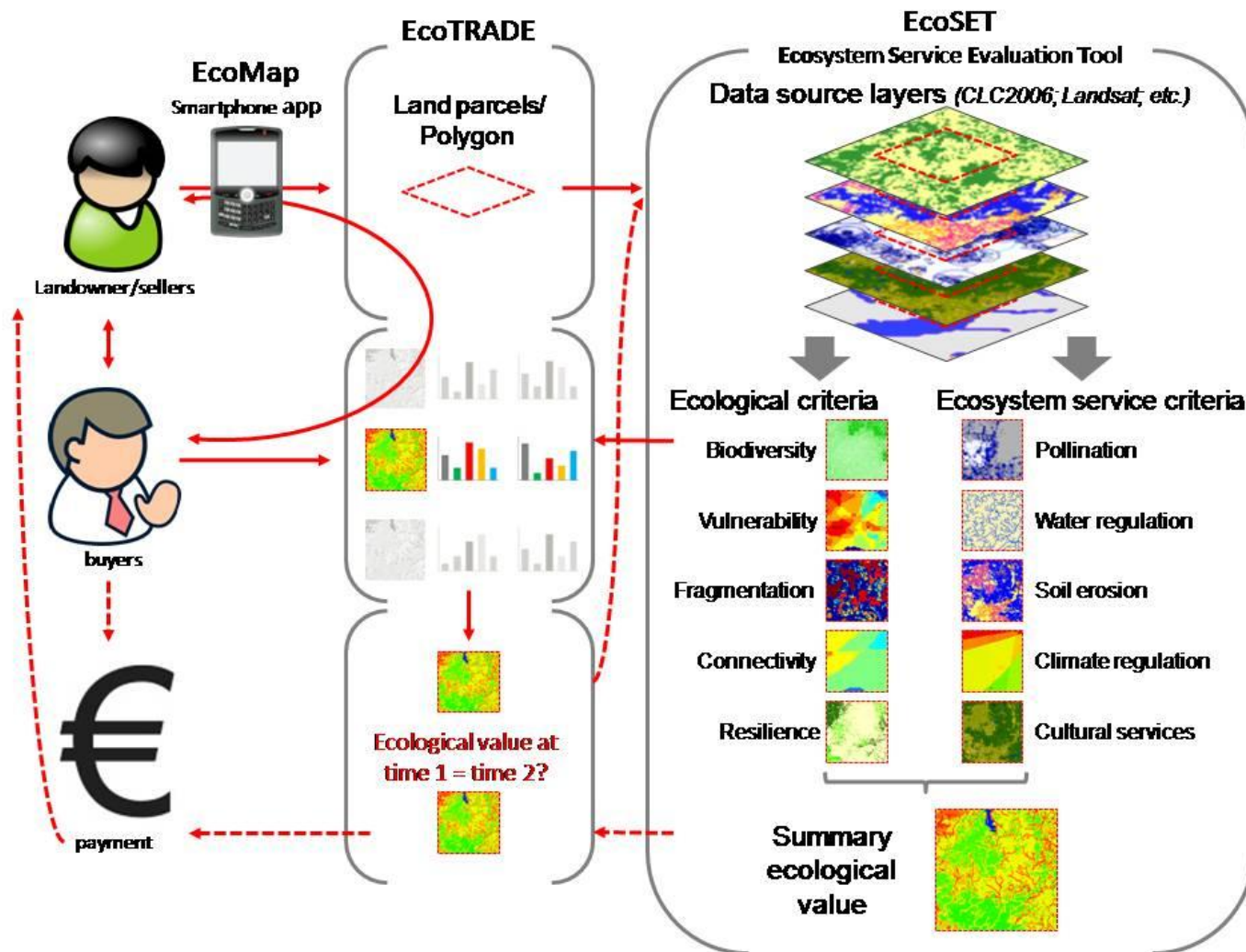


Summary Ecological Value

Red indicates high relative ecological value; blue areas indicate a lower relative ecological value



Next Step: ECOSET: Ecosystem Service Evaluation Tool





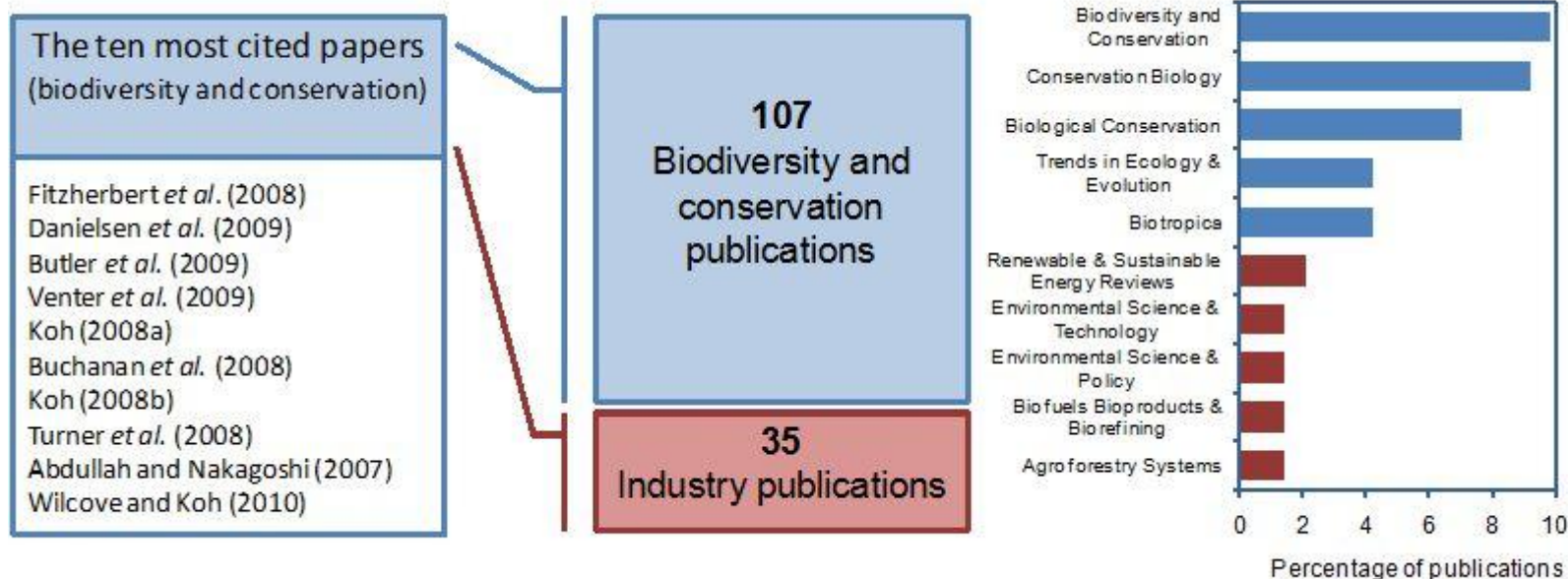
Development of footprinting tools for the oil palm industry

LEFT (Local Ecological Footprinting Tool)

ECOSET (Ecosystem Service Evaluation Tool)

- Identifying sites with high conservation potential
- Identifying areas where there might be problems due to : Soil erosion, Water regulation
- Development for identifying vegetation categories such as degraded land
- Long term monitoring for the ecological value on the landscape

Importance of links between research and industry



Turner, Snaddon *et. al* 2011 InTech.



Summary Slide

1. Two current change phases where ecological land use planning is useful
 - Expansion
 - Replanting
2. Monitoring and environmental assessment can take time
3. There is a need for high quality, cost effective spatial data on ecological and ecosystem service values
4. Development of ecological and ecosystem service tool for the oil palm production

Acknowledgements

University of Cambridge

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- Dr Ed Turner



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YAYASAN SABAH



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Thank you

www.biodiversity.ox.ac.uk

Willis K. J. *et al.* Biological Conservation (2012) 147, 3-12
Determining the ecological value of landscapes beyond protected areas