

red-listing Odonata

theory, practice and results
of IUCN threat assessments



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Global Dragonfly Assessment

why Odonata?

red list process

getting data

global results

African details

application



Odonata are applied as indicators of aquatic biodiversity and watershed health

**water is
important!**



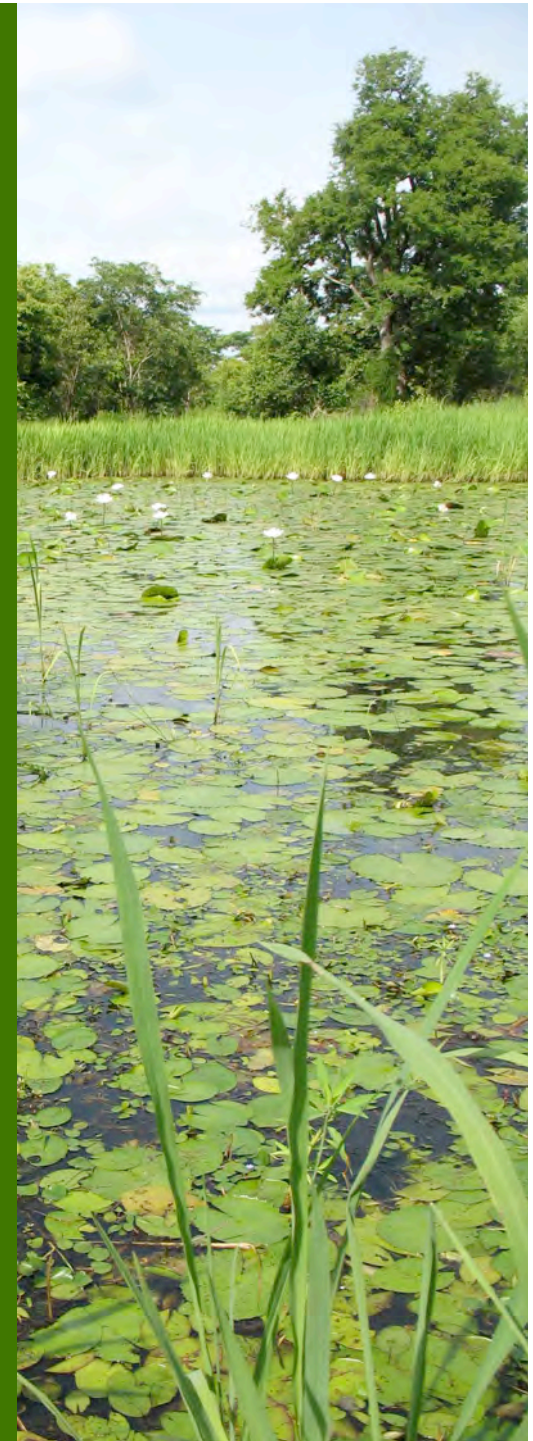
Why the conservation interest for Odonata?

- insects form the bulk of animal diversity
- increasing interest in 'other groups'

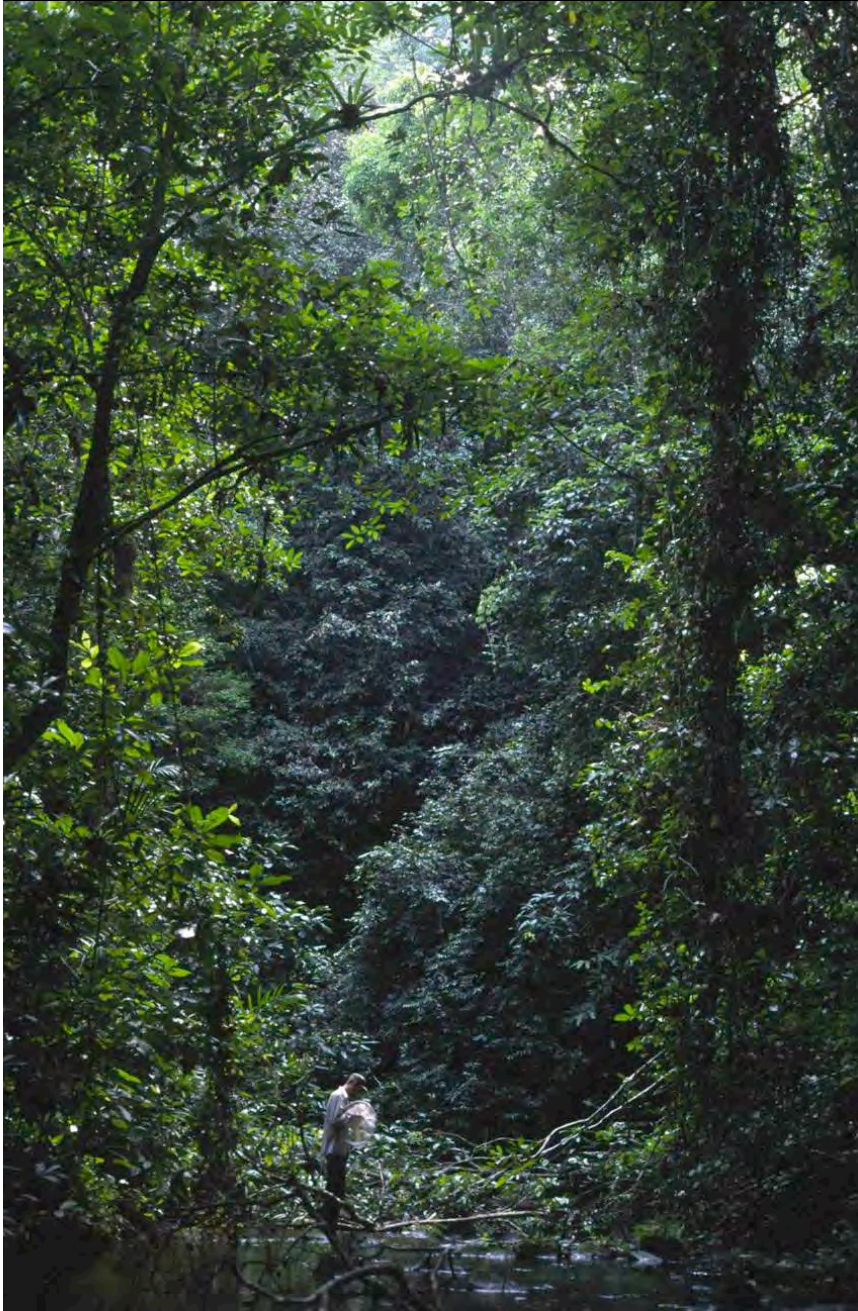
- freshwater is an important resource
- increasing interest in aquatic biodiversity

Odonata are convenient and attractive

- beautiful and popular
- relatively well studied



indicators of what?



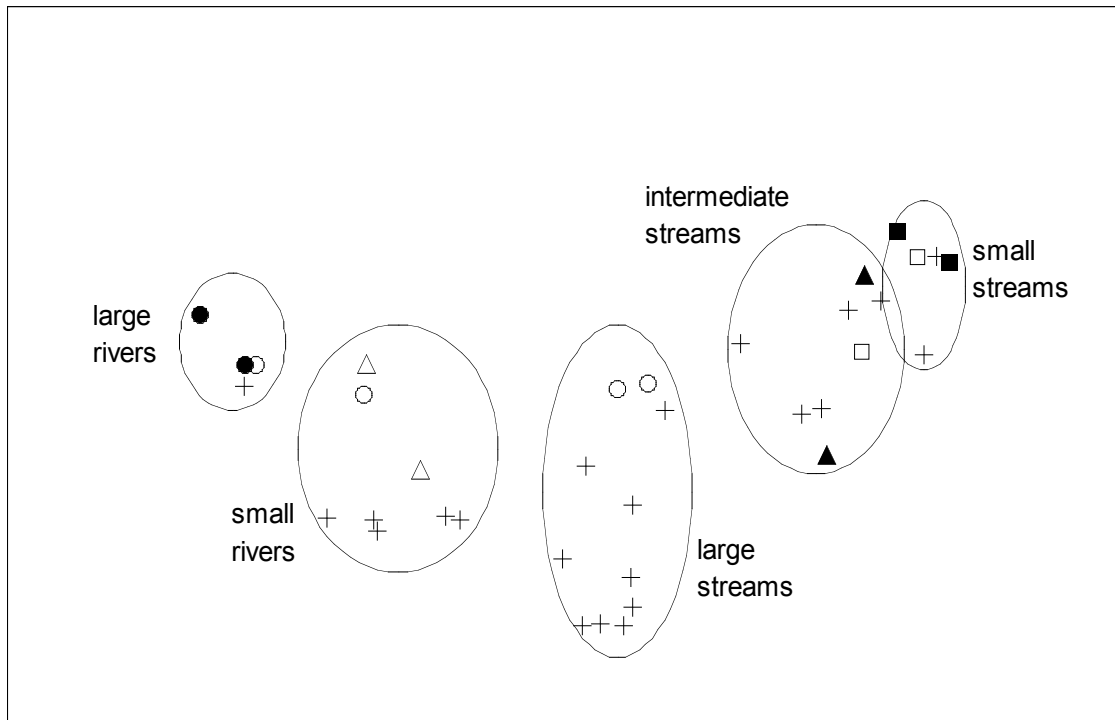
Ghana & Liberia (Dijkstra & Lempert, 2003)

36 sites, 66 species

Non-metric Multidimensional Scaling

79.1 % of variance explained

1st axis 52.4 % of variance

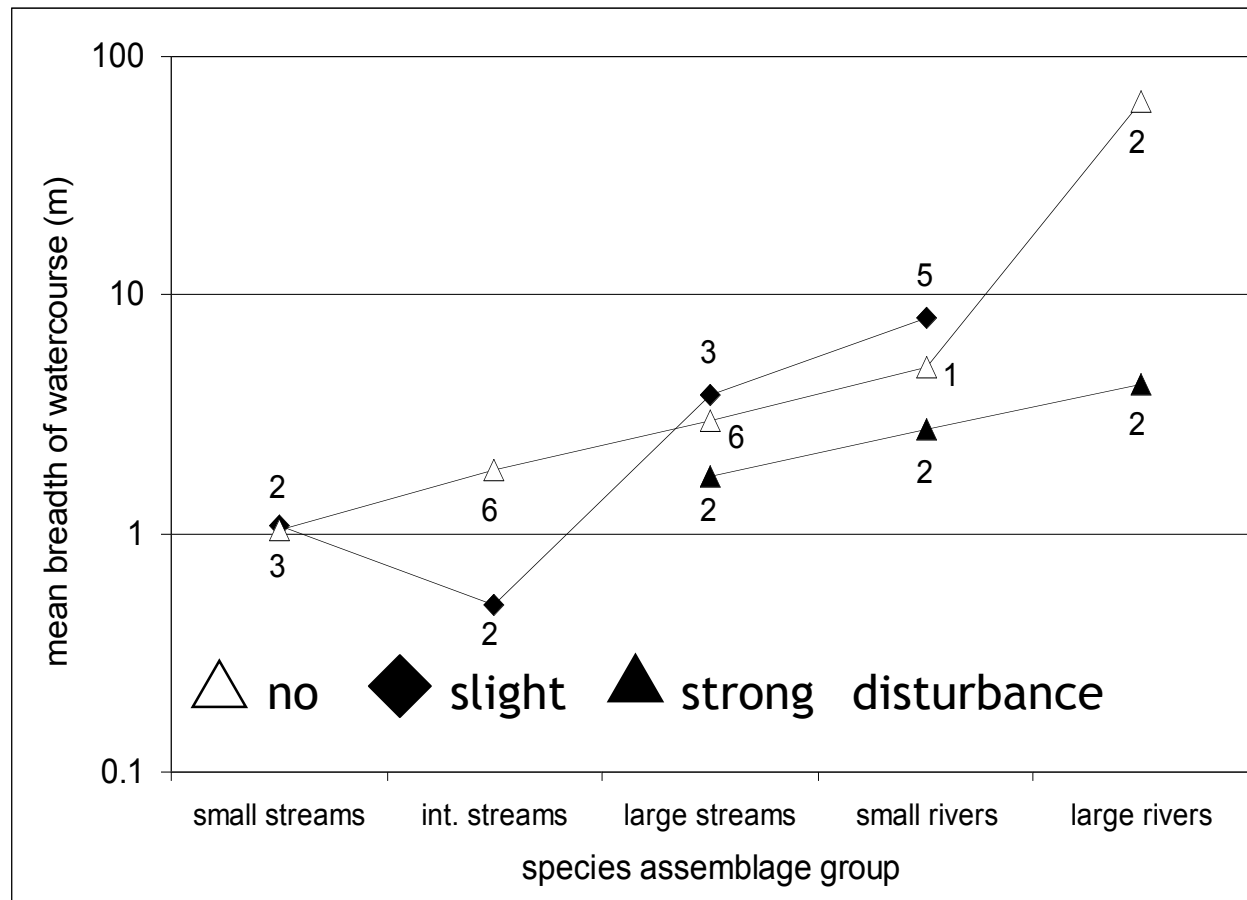


strongest correlation:

1. openness
2. mean breath
3. human disturbance

Ghana & Liberia (Dijkstra & Lempert, 2003)

36 sites, 66 species



human disturbance results in shift of odonate assemblages sites are 'down-scaled', i.e. upstream shift of species

biodiversity & threat: red list assessments



IUCN assessments of
freshwater biodiversity:

Odonata only
insects included



IUCN Red List Categories

Least Concern (LC)

Threatened:

Vulnerable (VU)

Endangered (EN)

Critically Endangered (CR)

... when in doubt:

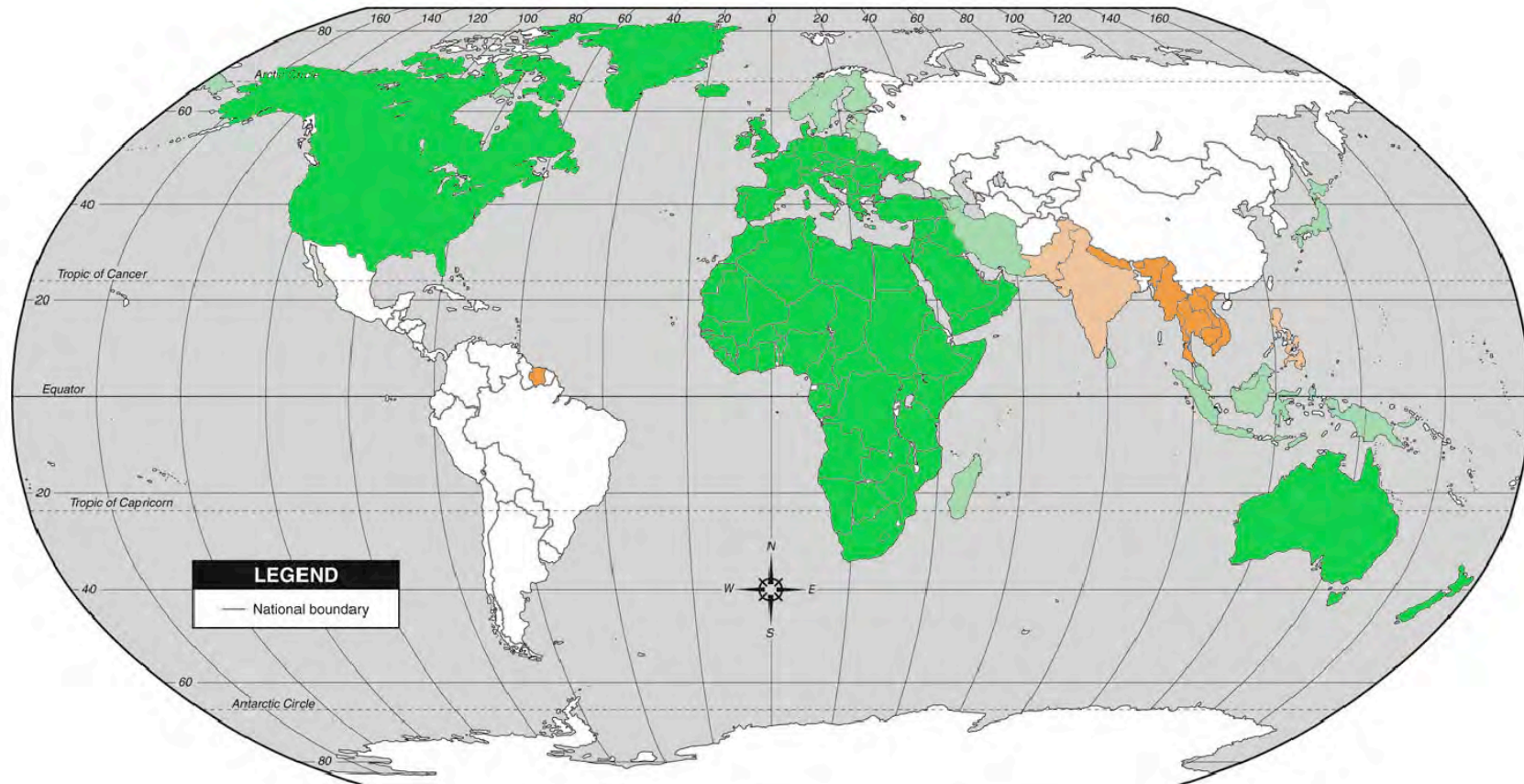
Data Deficient (DD)

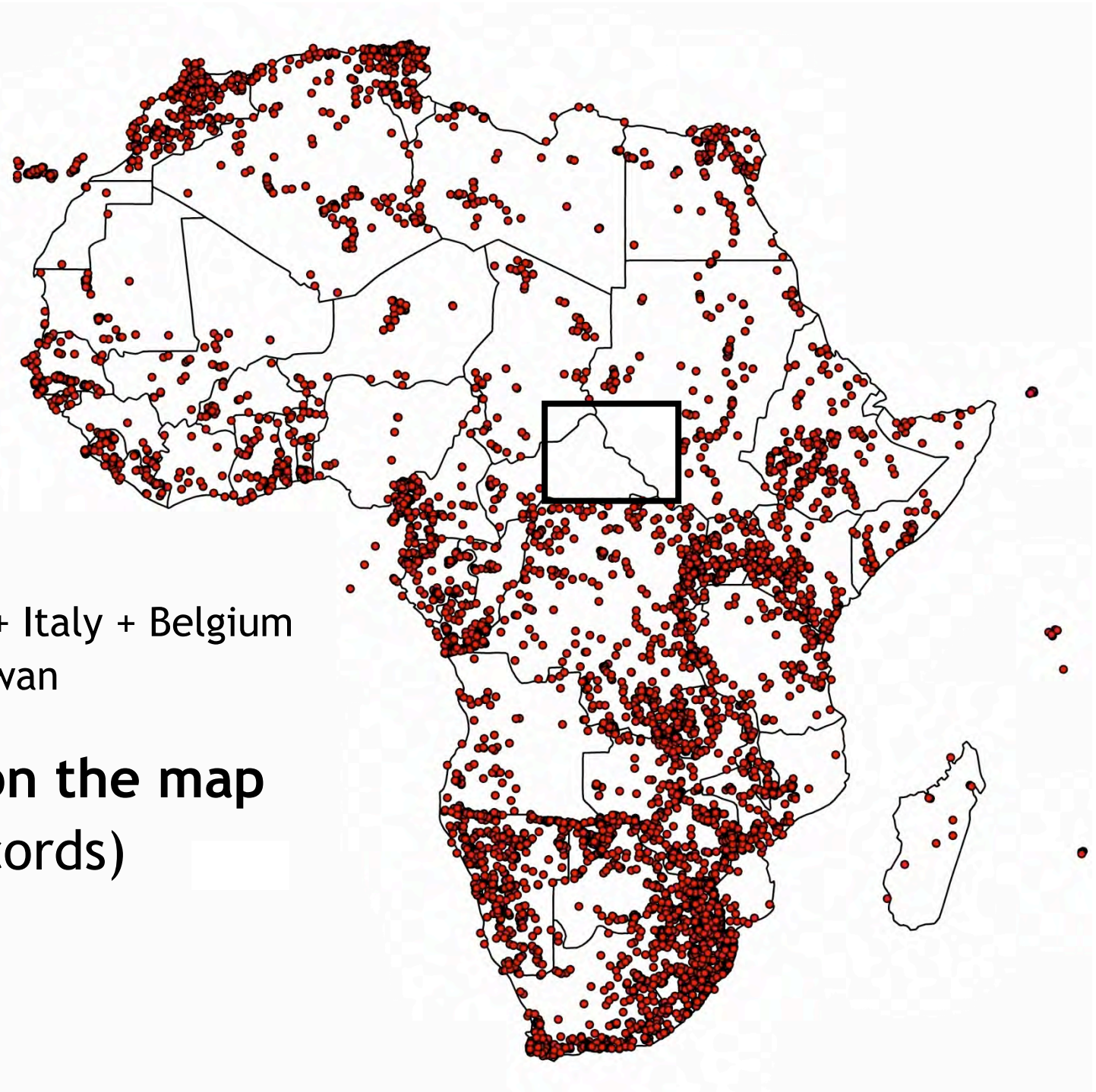
Near Threatened (NT)

> **distribution data**



green: mapping completed
pale green: in progress
orange: work starts in 2009
pale orange: serious plans





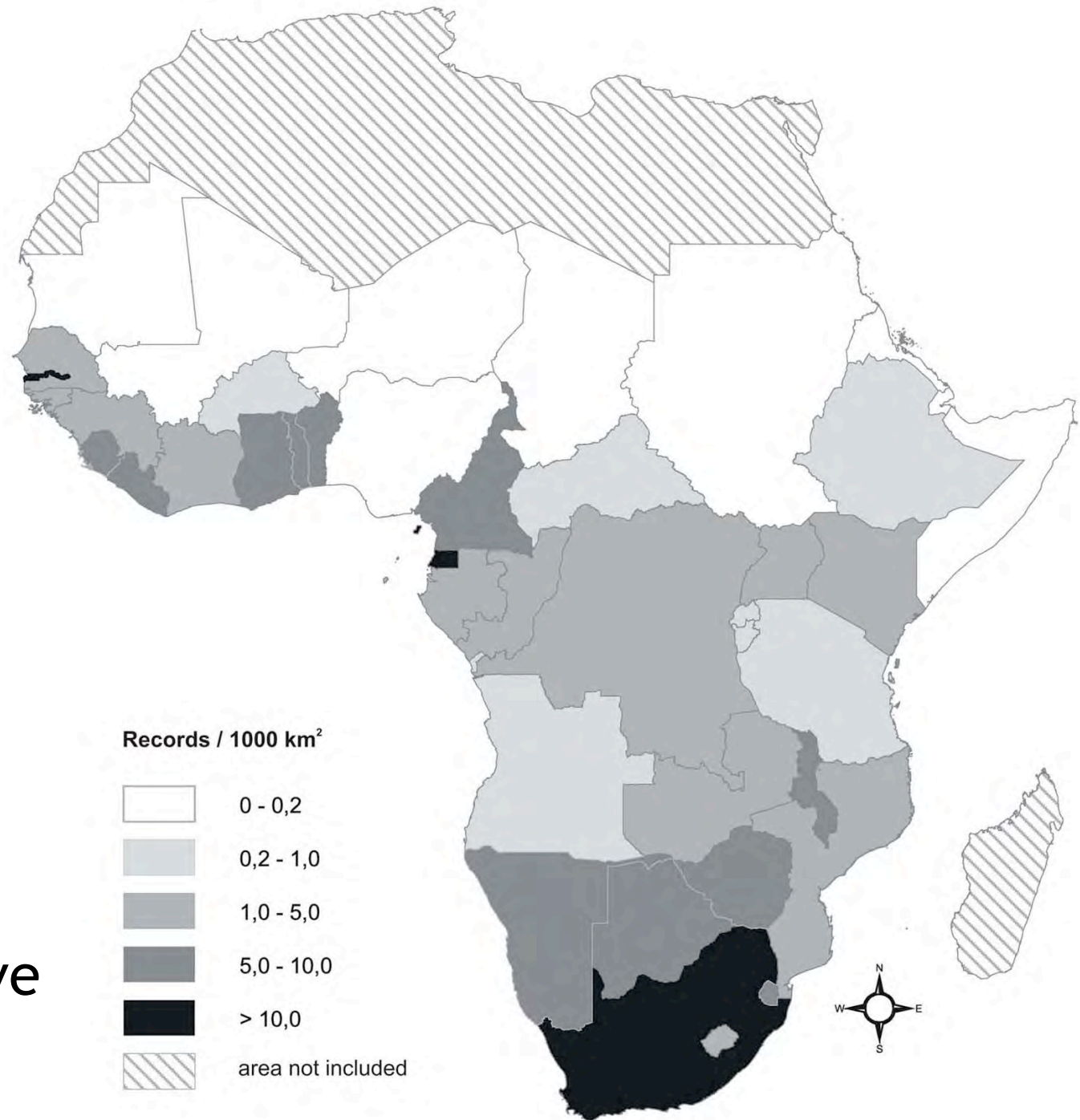
1200 x
800 km

France + Italy + Belgium
27x Taiwan

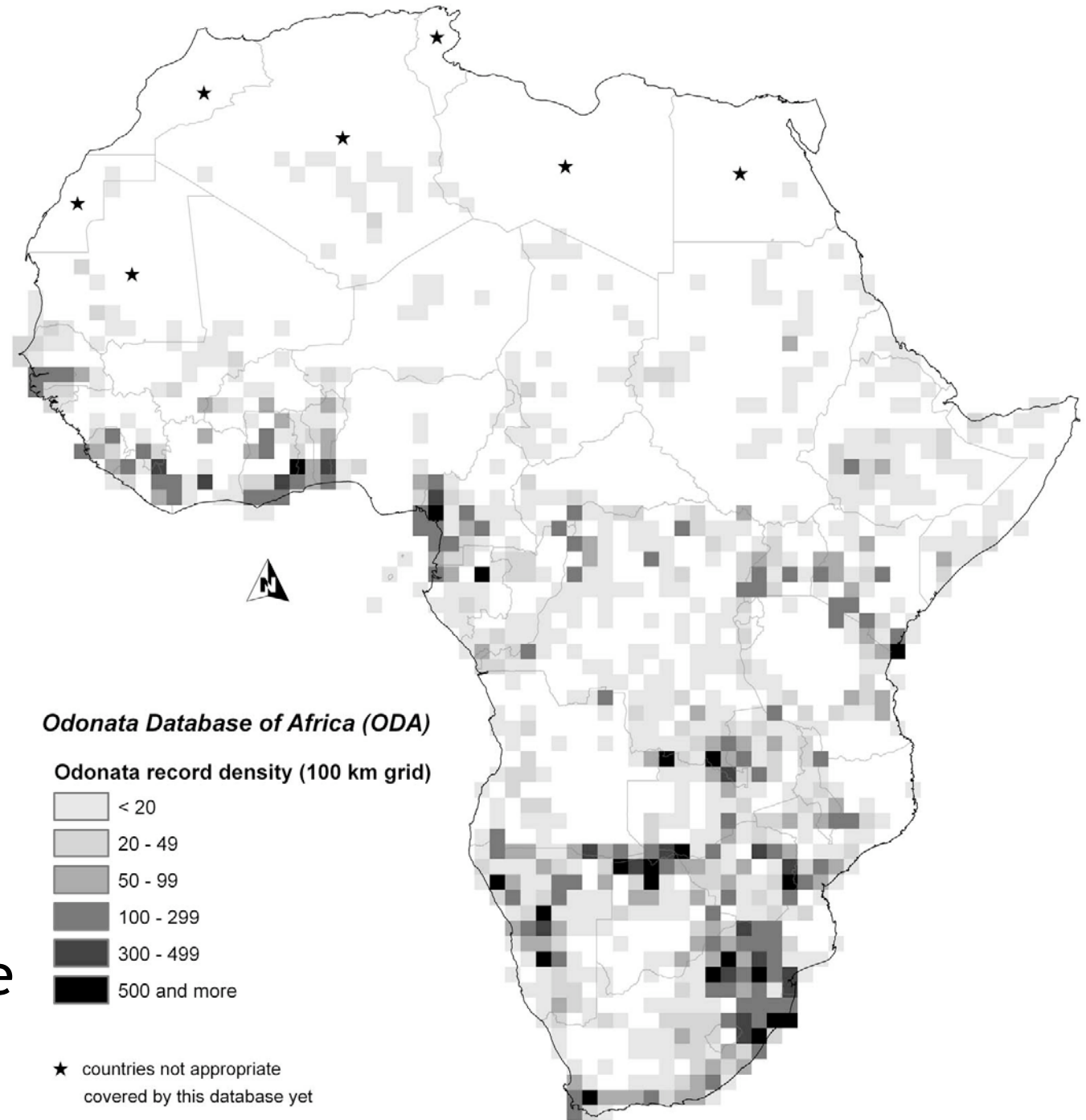
many dots on the map
(>80,000 records)

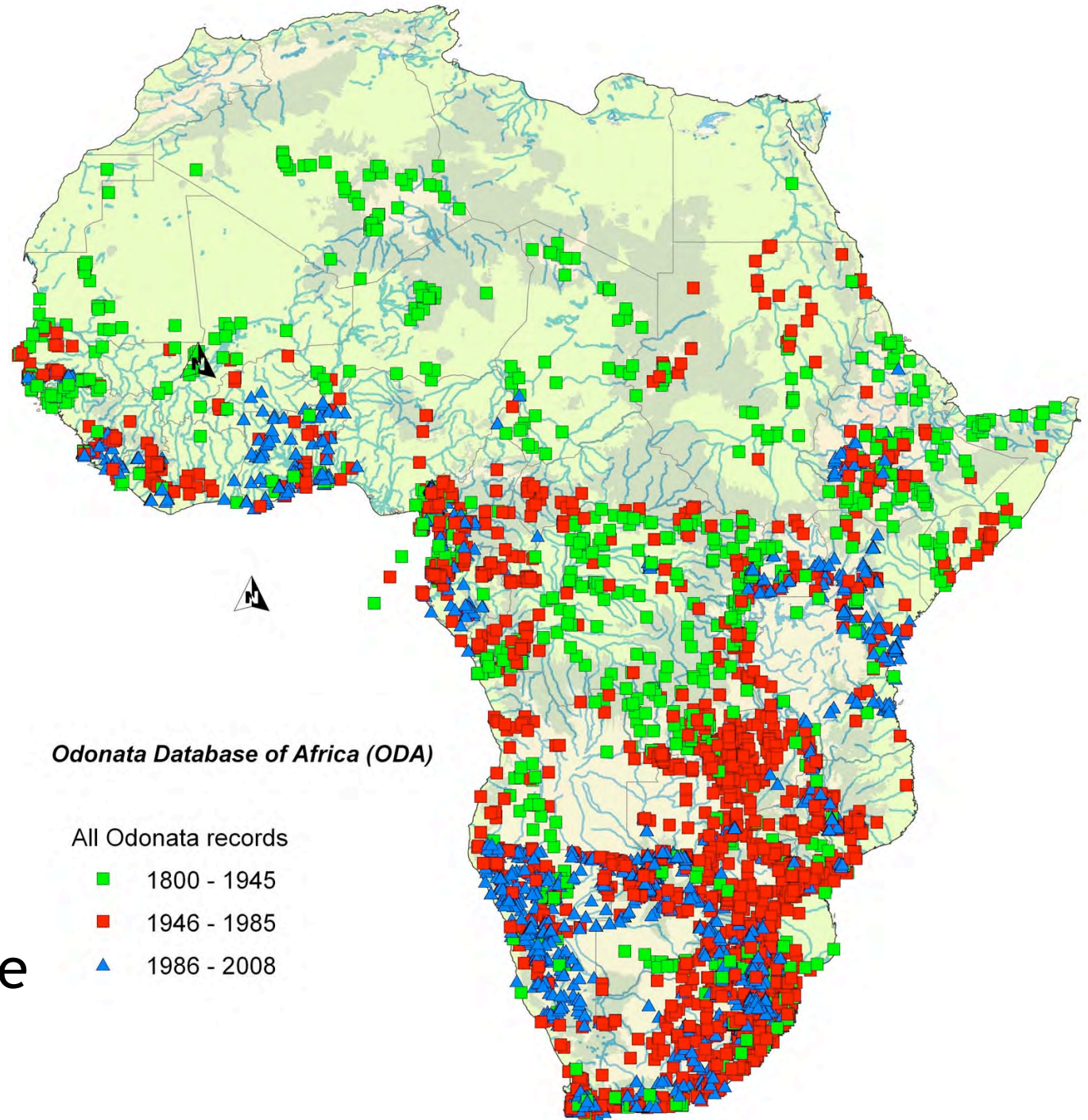
look good...

but it's relative
in space...



but it's relative
in space...

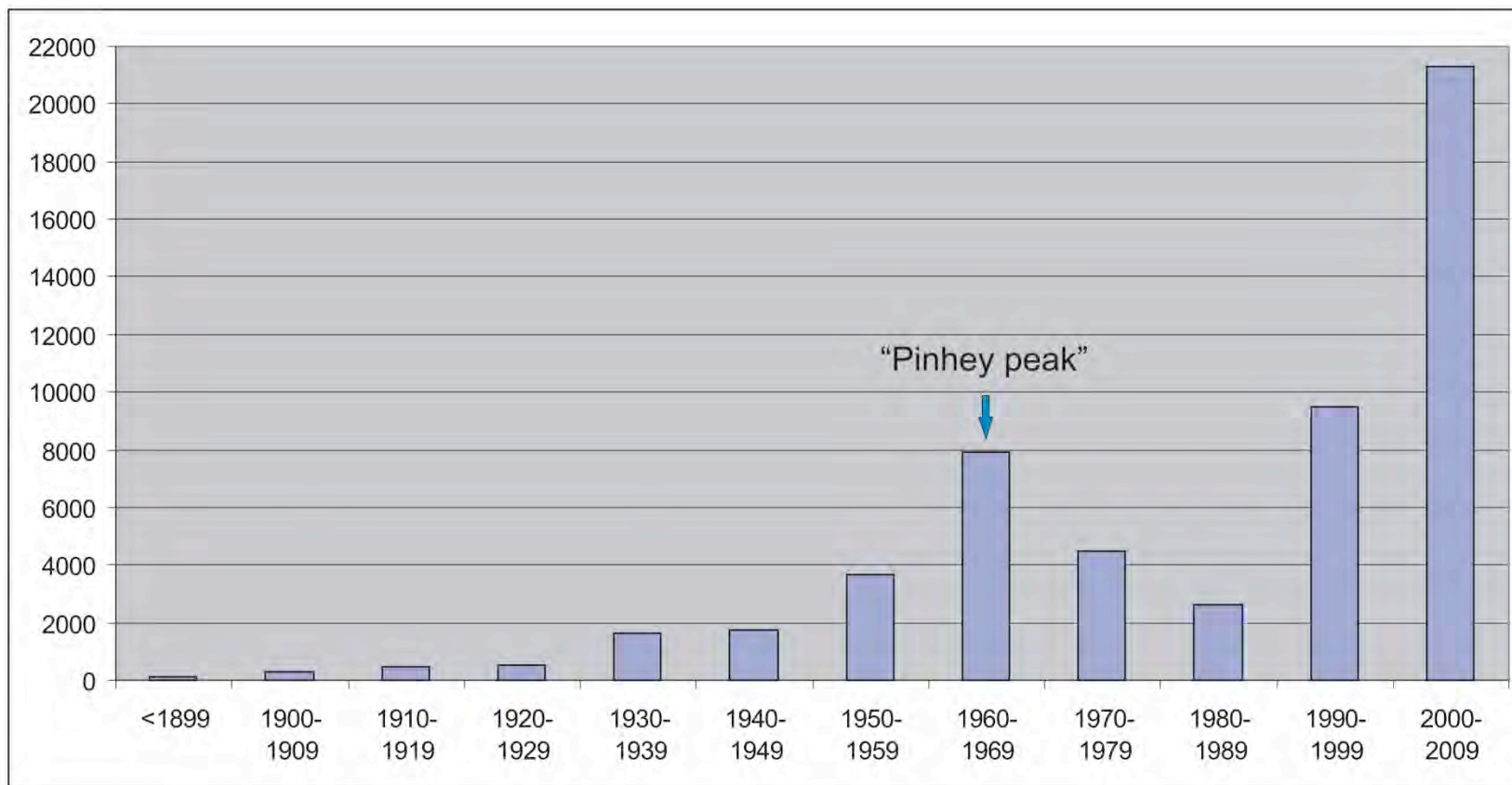




but it's relative
... and time

three periods

1. pre-Pinheyian (early colonial)
2. Pinheyian (1950s-1970s; late colonial)
3. post-Pinheyian (independence)

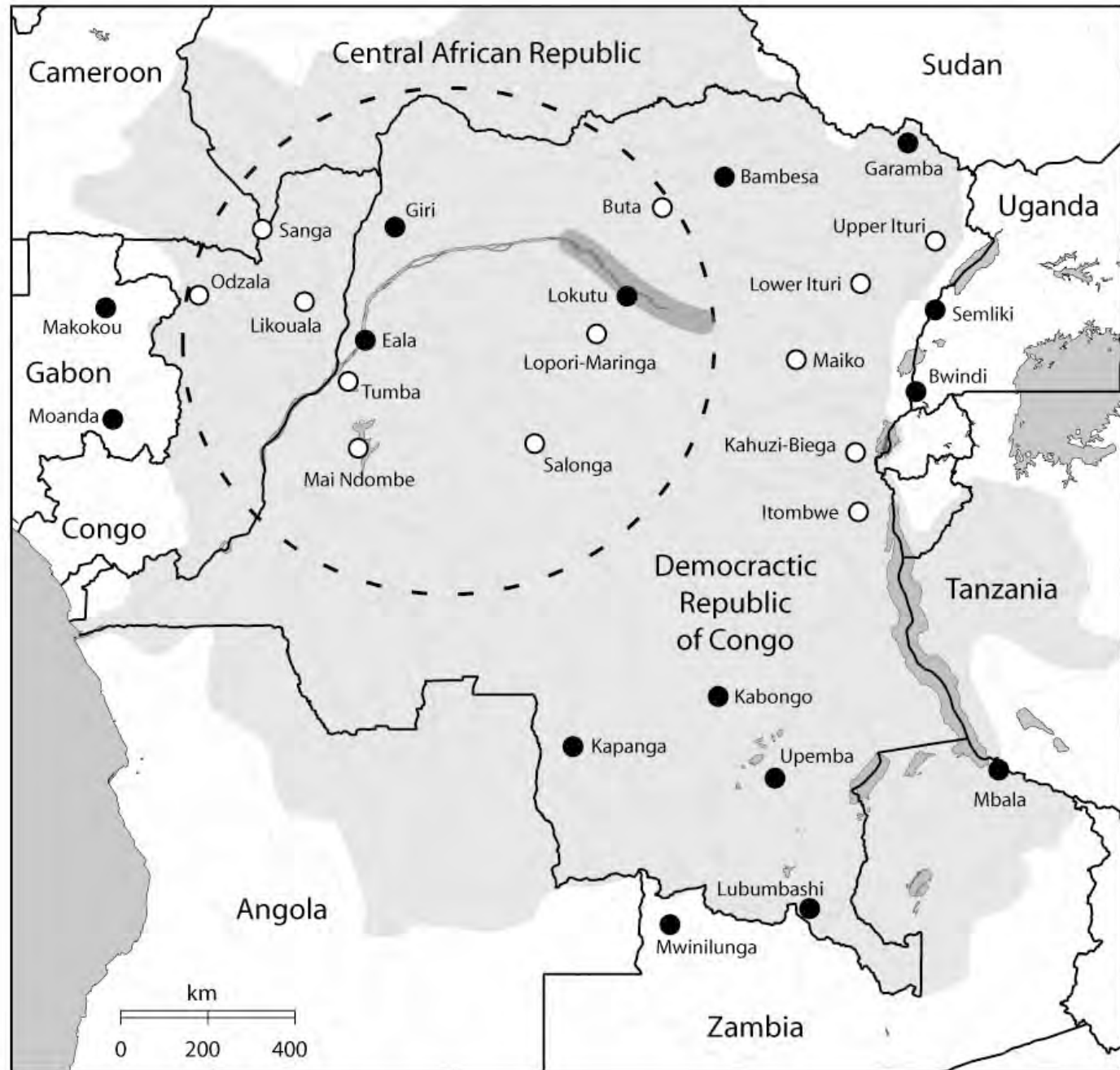


Lack of records

Congo Basin

points with reasonable data on Odonata ●

sites of conservation priority but no data! ○





n = 385

n = 130

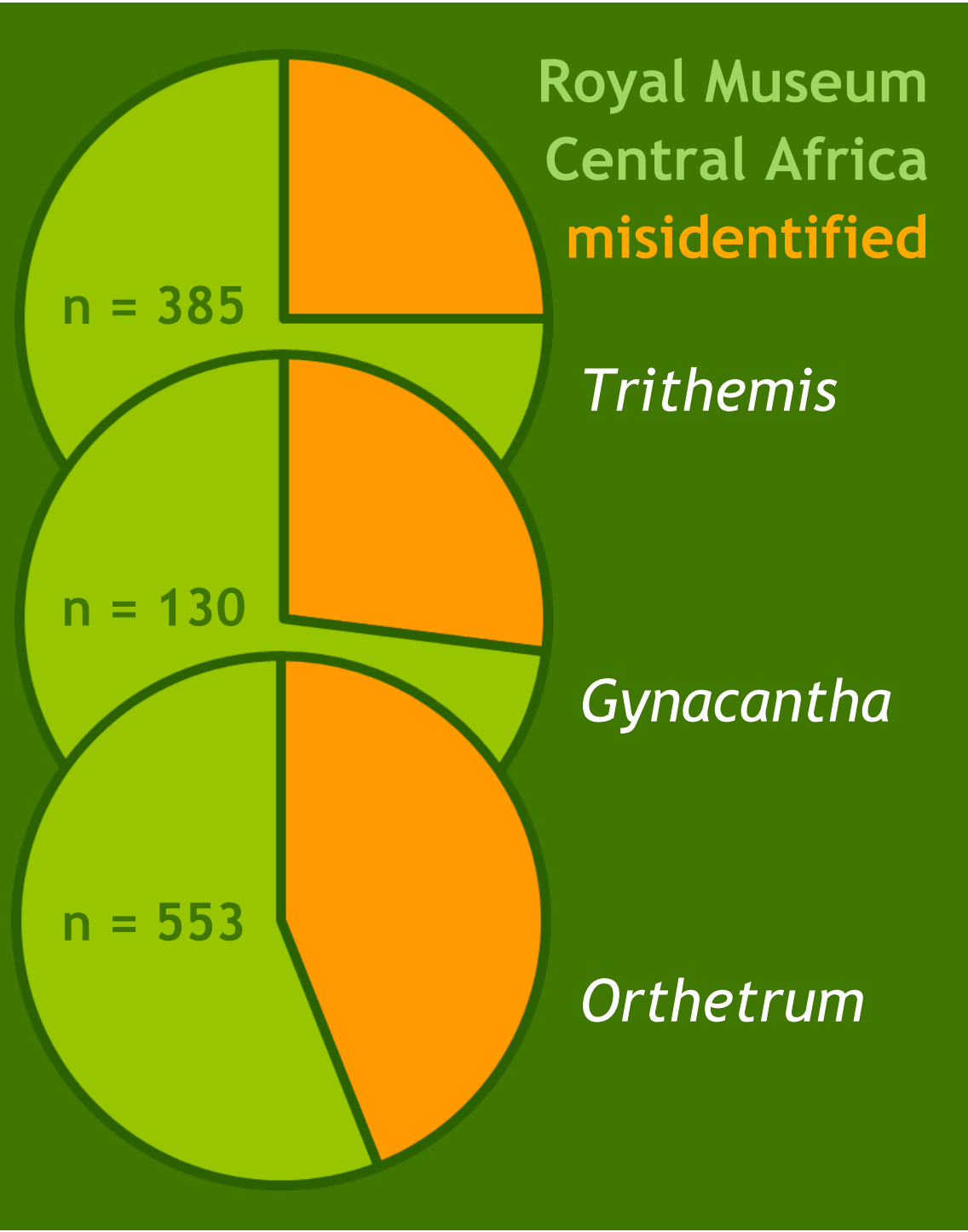
n = 553

Royal Museum
Central Africa
misidentified

Trithemis

Gynacantha

Orthetrum

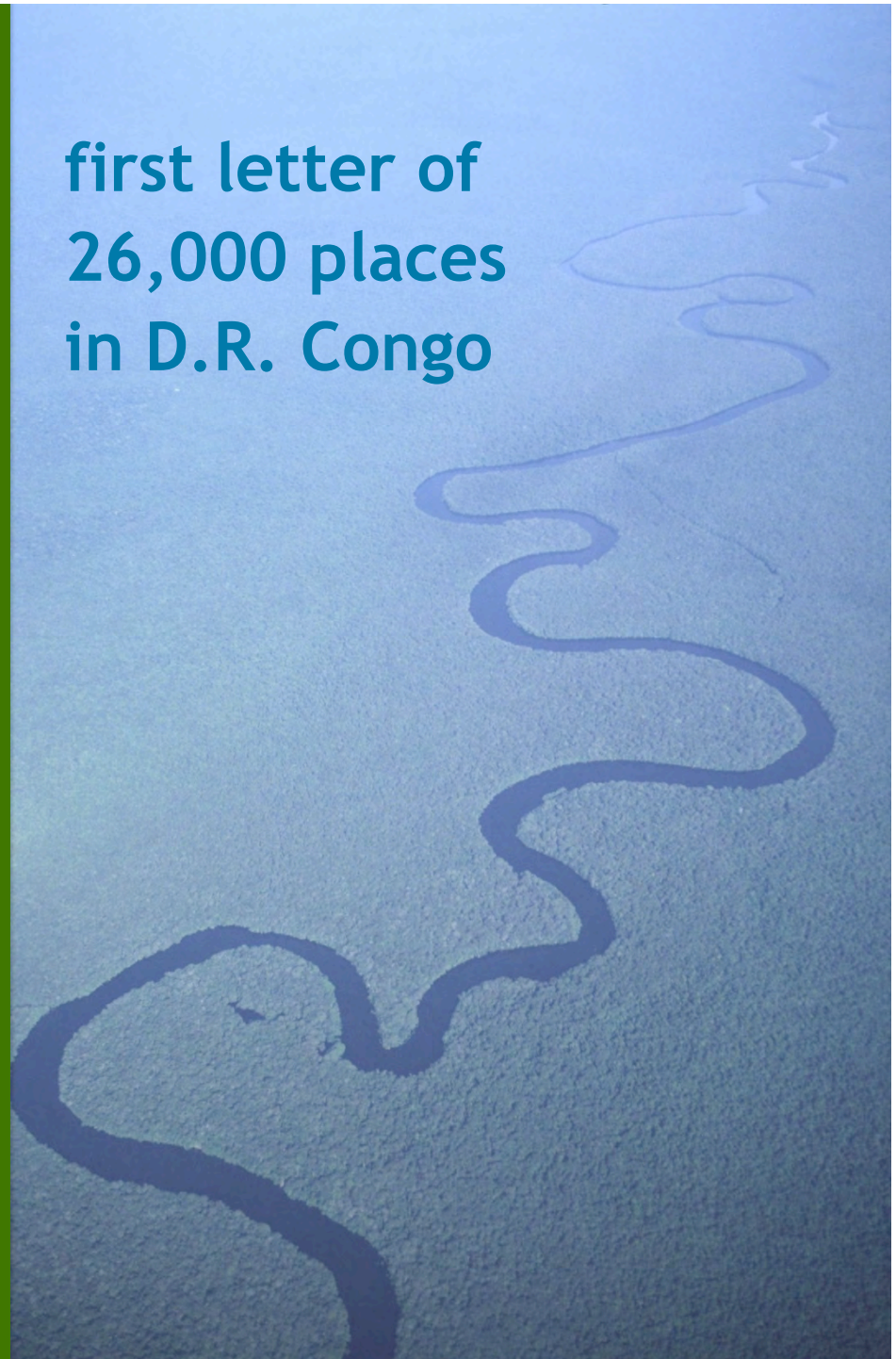




placing dots on the map

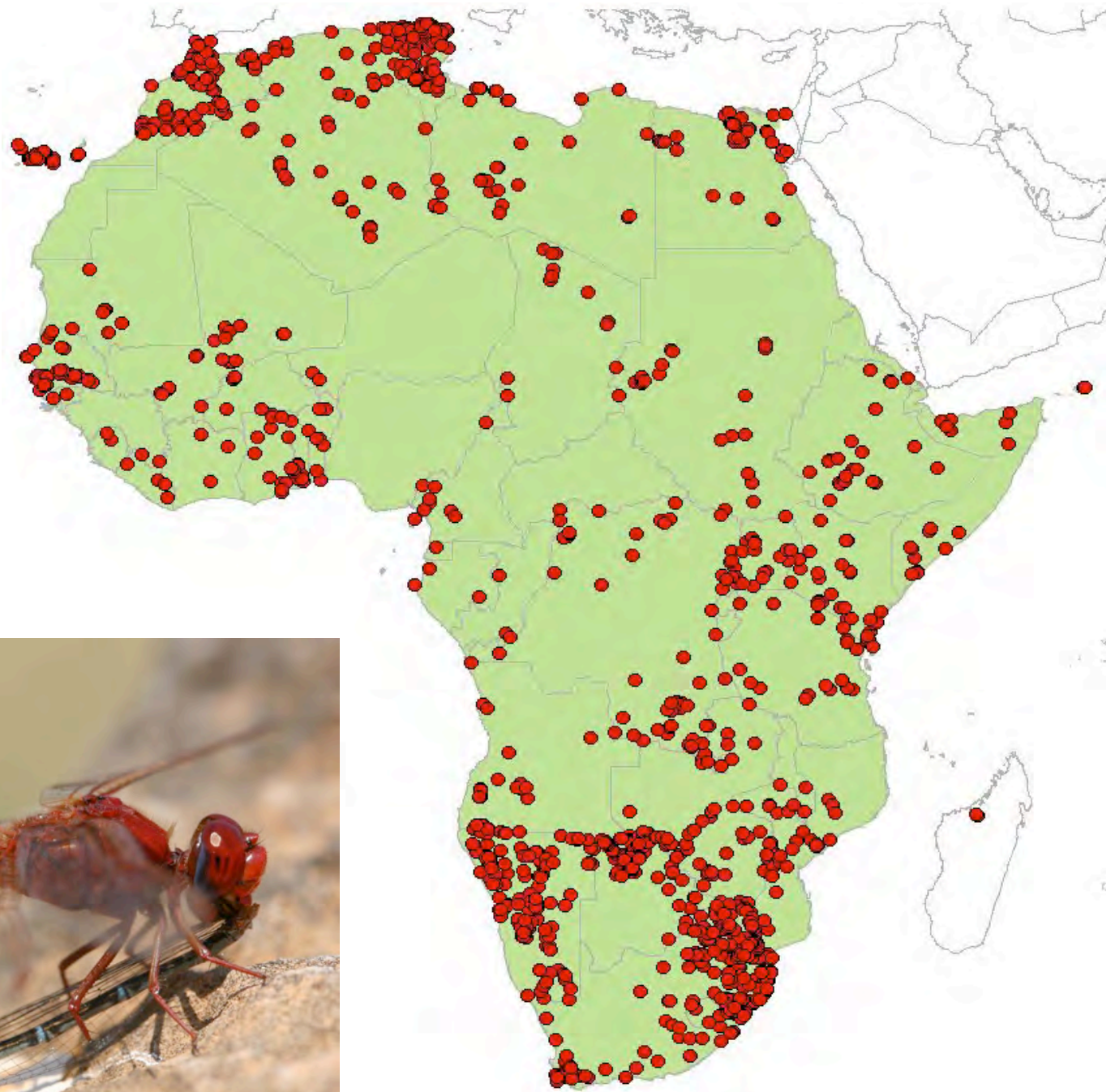
is difficult... when many
names occur many times

first letter of
26,000 places
in D.R. Congo



Results!

Crocothemis erythraea



most-recorded species in tropical Africa:

1. *Crocothemis erythraea*



most-recorded species in tropical Africa:

1.

2. *Trithemis arteriosa*



most-recorded species in tropical Africa:

- 1.
- 2.
3. *Pantala flavescens*



most-recorded in tropical Africa:

- 1.
- 2.
- 3.
4. *Ischnura senegalensis*



most-recorded in tropical Africa:

1.

2.

3.

4.

5. *Ceriagrion glabrum*



most-recorded species in tropical Africa:

1.

2.

3.

4.

5.

6.

7. *Orthetrum
chrysostigma*



most-recorded species in tropical Africa:

1.

2.

3.

4.

5.

6.

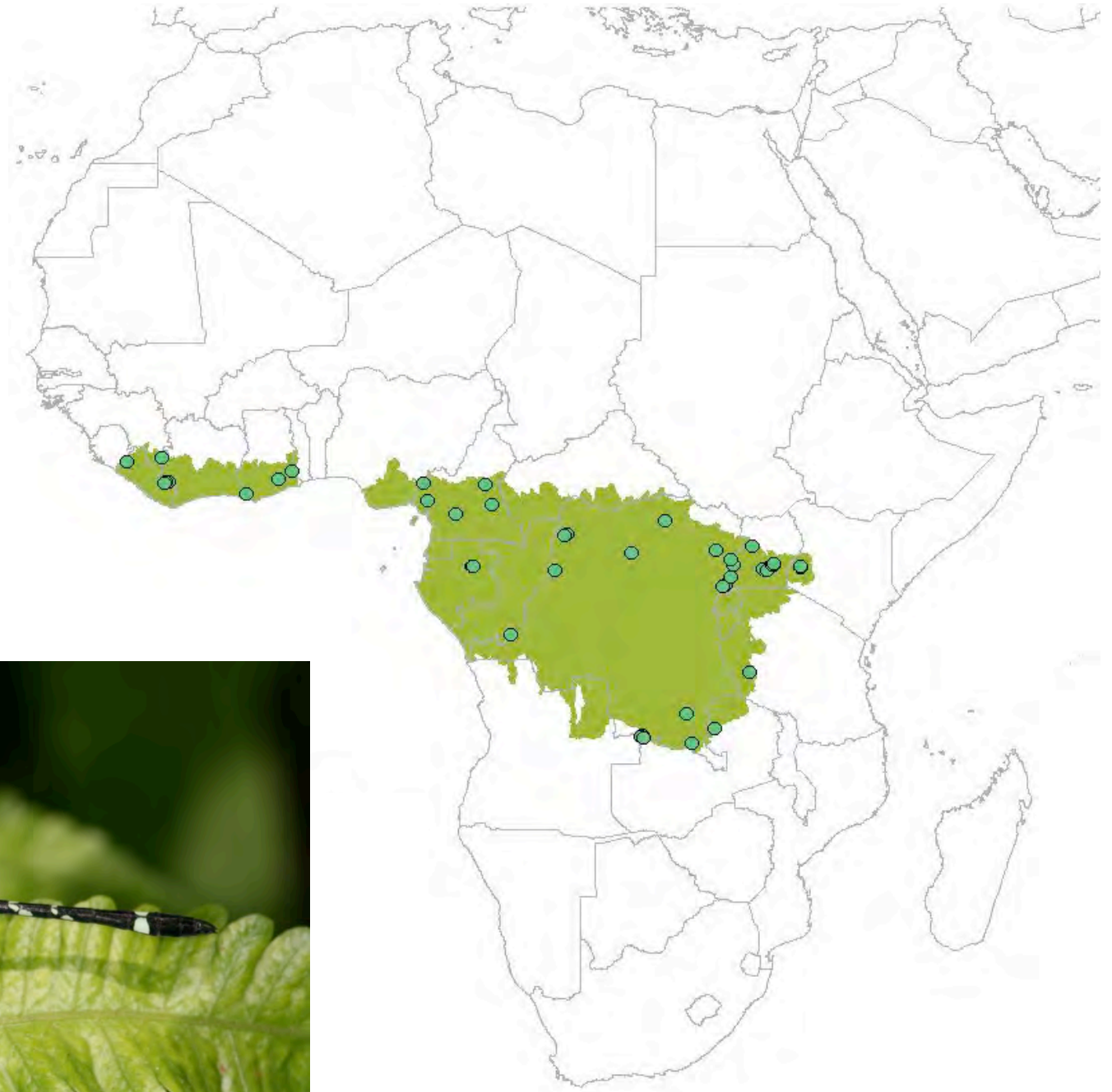
7.

8.

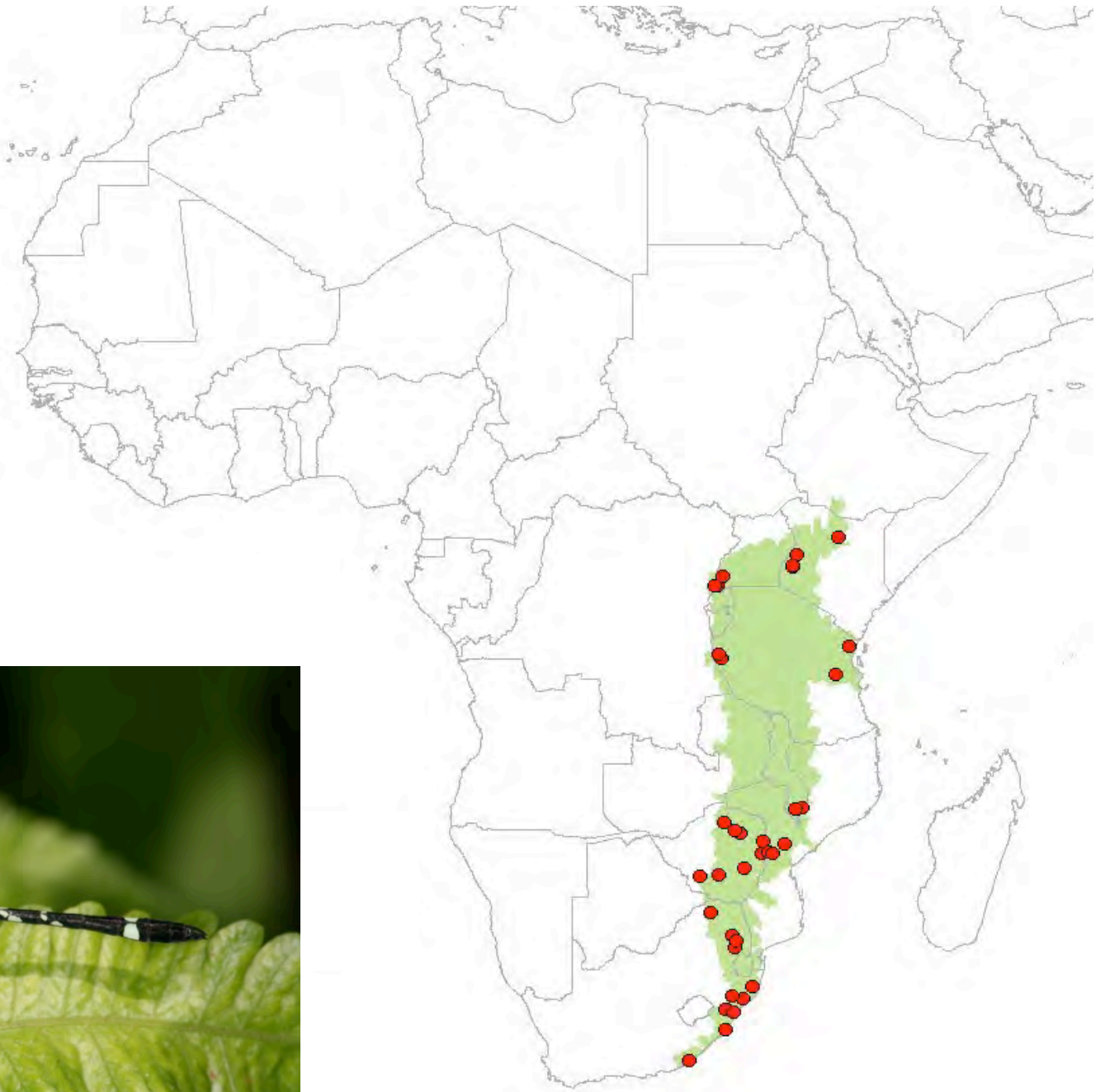
9. *Diplacodes lefebvrii*



***Notiothemis
robertsi***



*Notiothemis
jonesi*





global diversity Odonata

about 5700 species

... at most 7000?

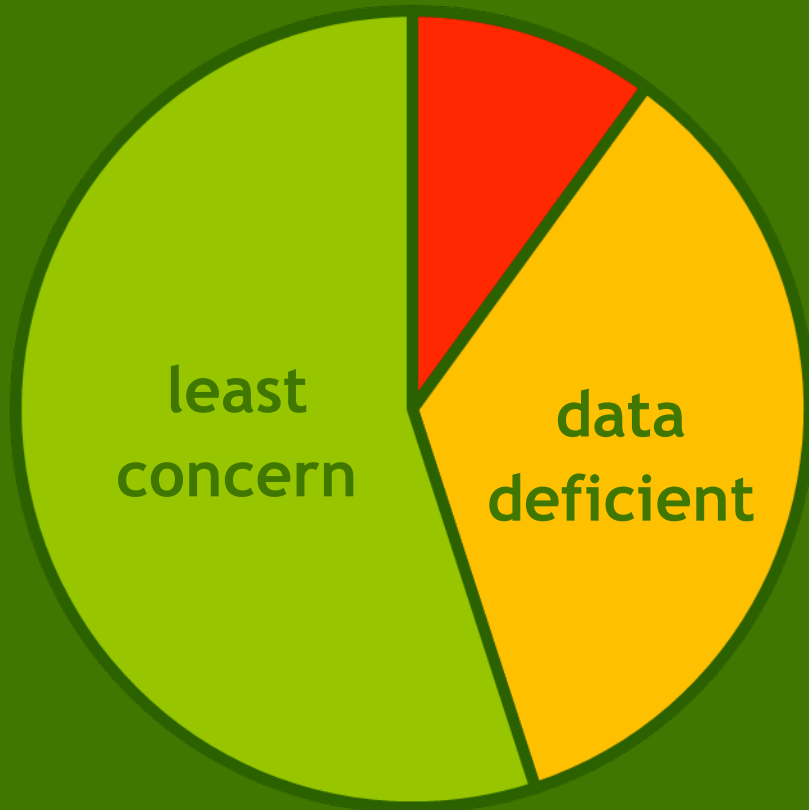




Red List Index: Odonata

1500 species assessed
... 4200 species remaining



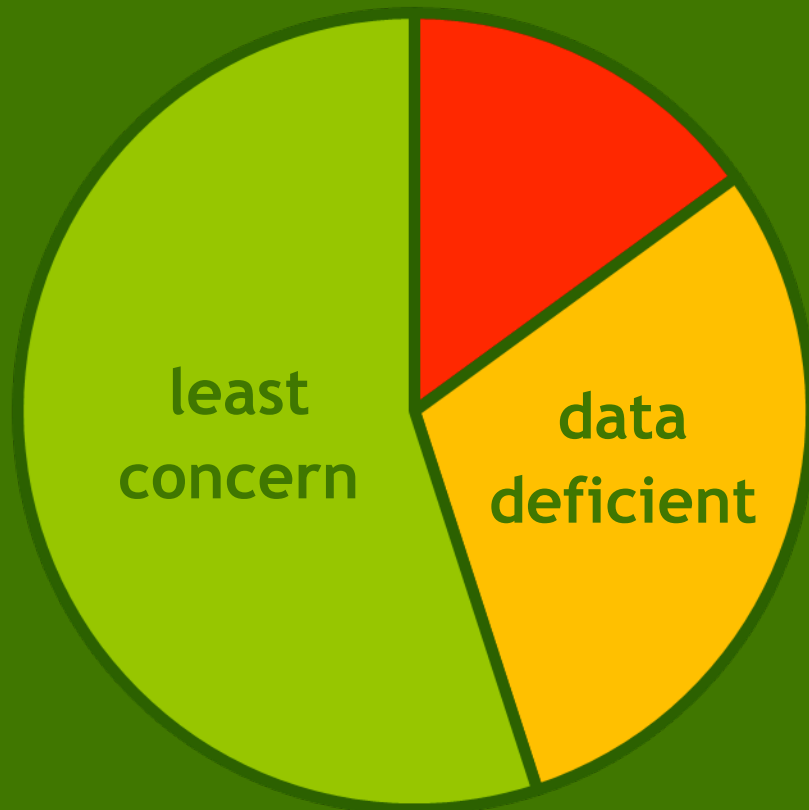


Red List Index: Odonata

10% threatened

35% data deficient





Red List Index: Odonata

10% threatened + 5% ?

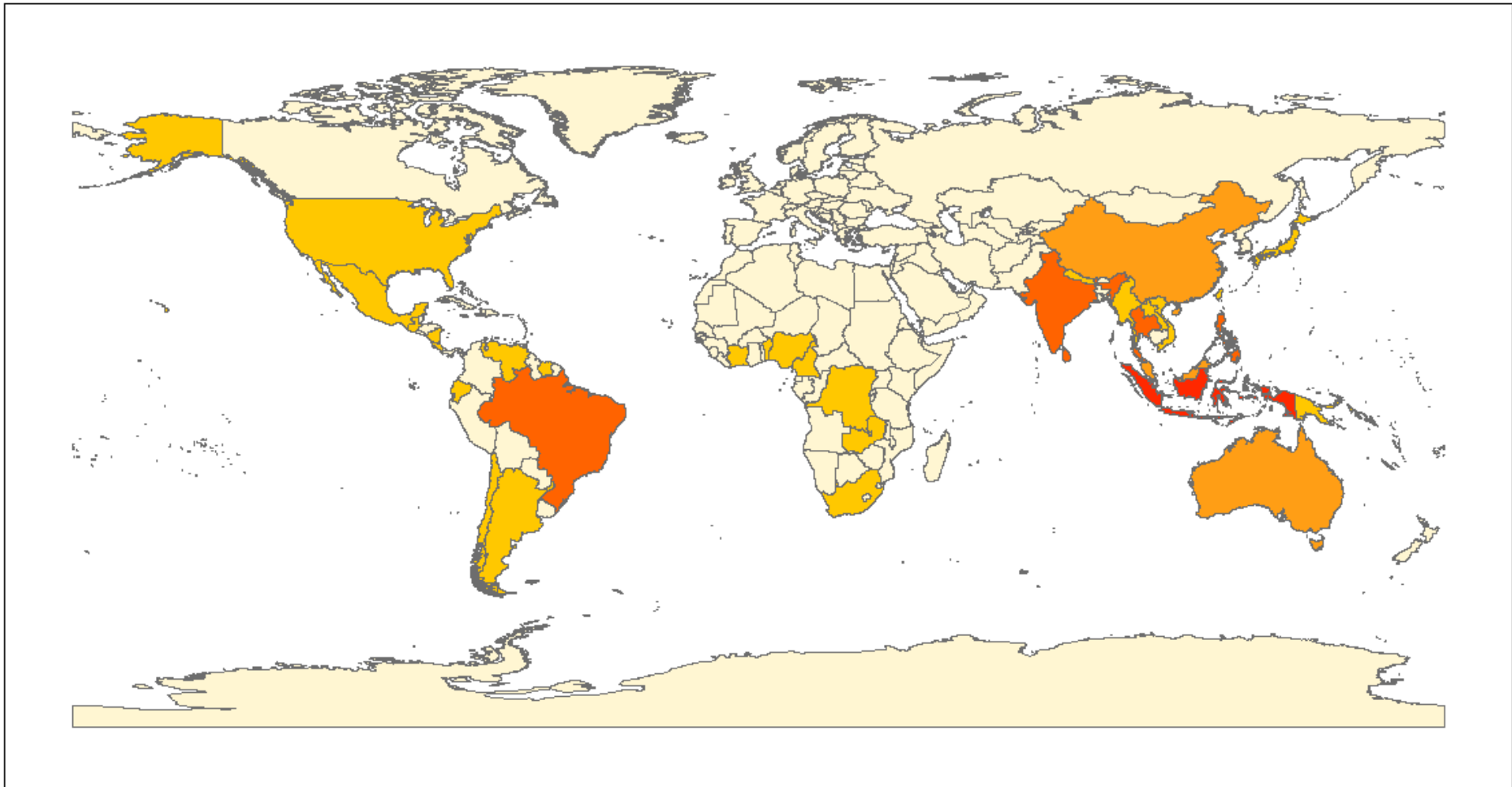
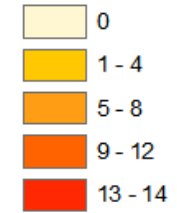
35% data deficient



Threatened Species

... more in regions of high species diversity

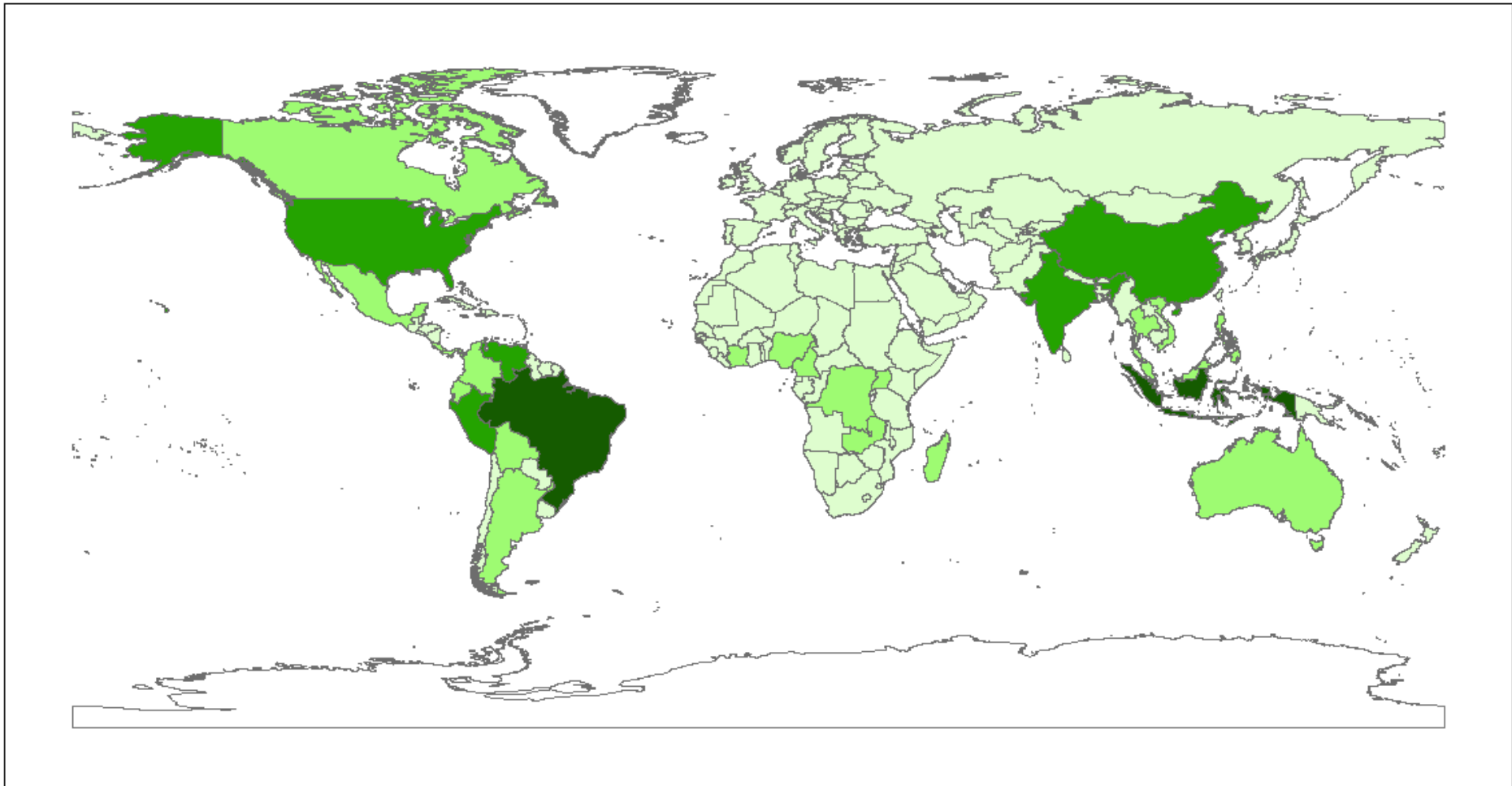
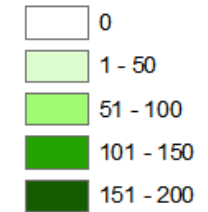
Number of Species



Species Richness

... is needed to determine relative levels of threat

Number of Species



45% of Sri Lanka's odonates
are endemic (53 species!):
many are endangered

*Cyclogomphus
gynostylus*

Libellago greeni

*Mortonagrion
ceyonicum*

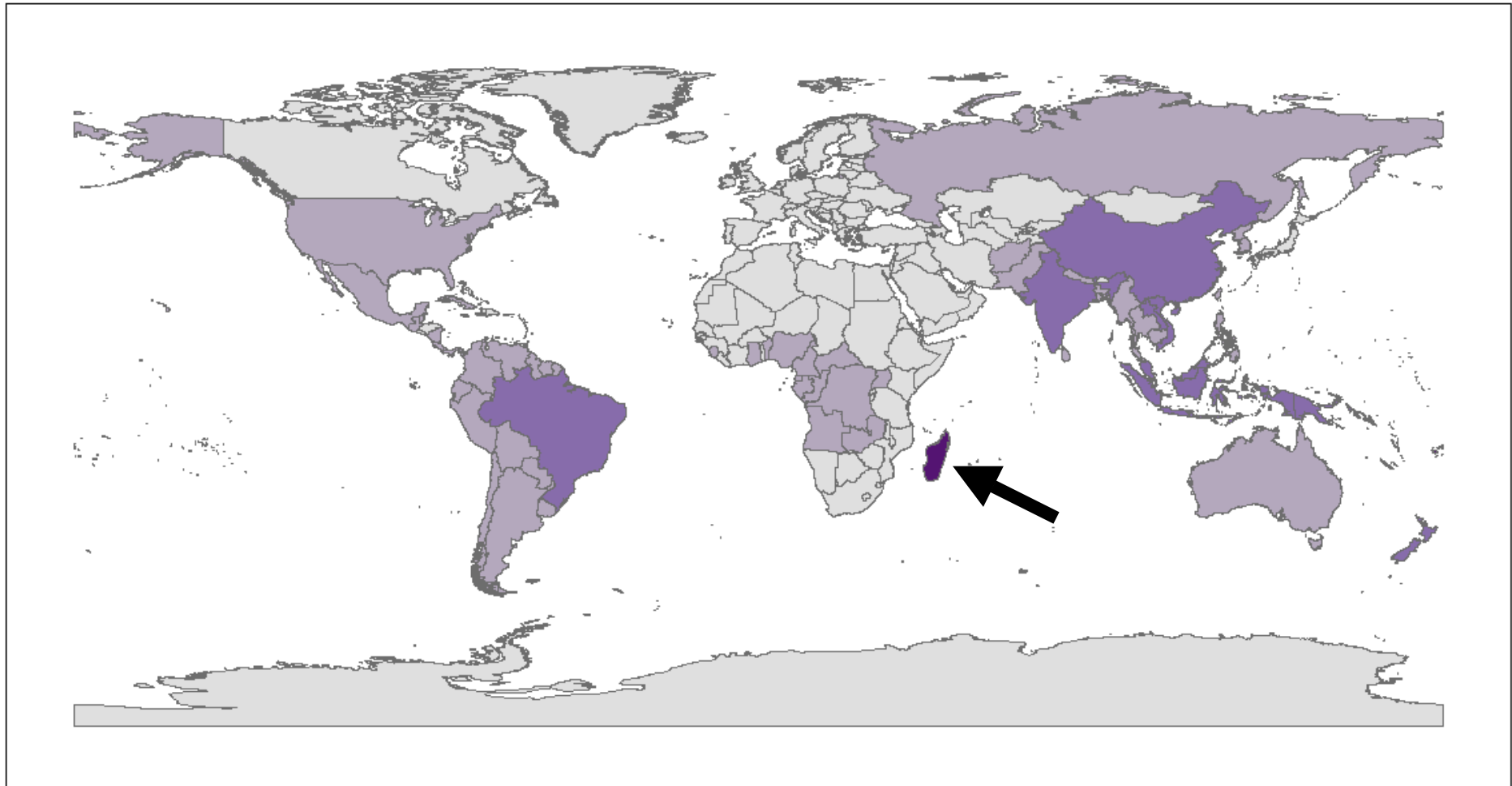
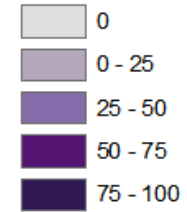
*Elatoneura
caesia*

*Tetrathemis
yerburyii*

Proportion of Data Deficient Species

... greater in (tropical) regions of high diversity

Percentage Data Deficient





Madagascar

175+ species
77% endemic

hyper-deficiency of data

little research
since 1960s

40% forest decrease
since 1950



data deficient: *Viridithemis viridula* Fraser, 1960

single female holotype from W Madagascar, 1952

unusual green libellulid, only species of genus





all recent
records are
photographic

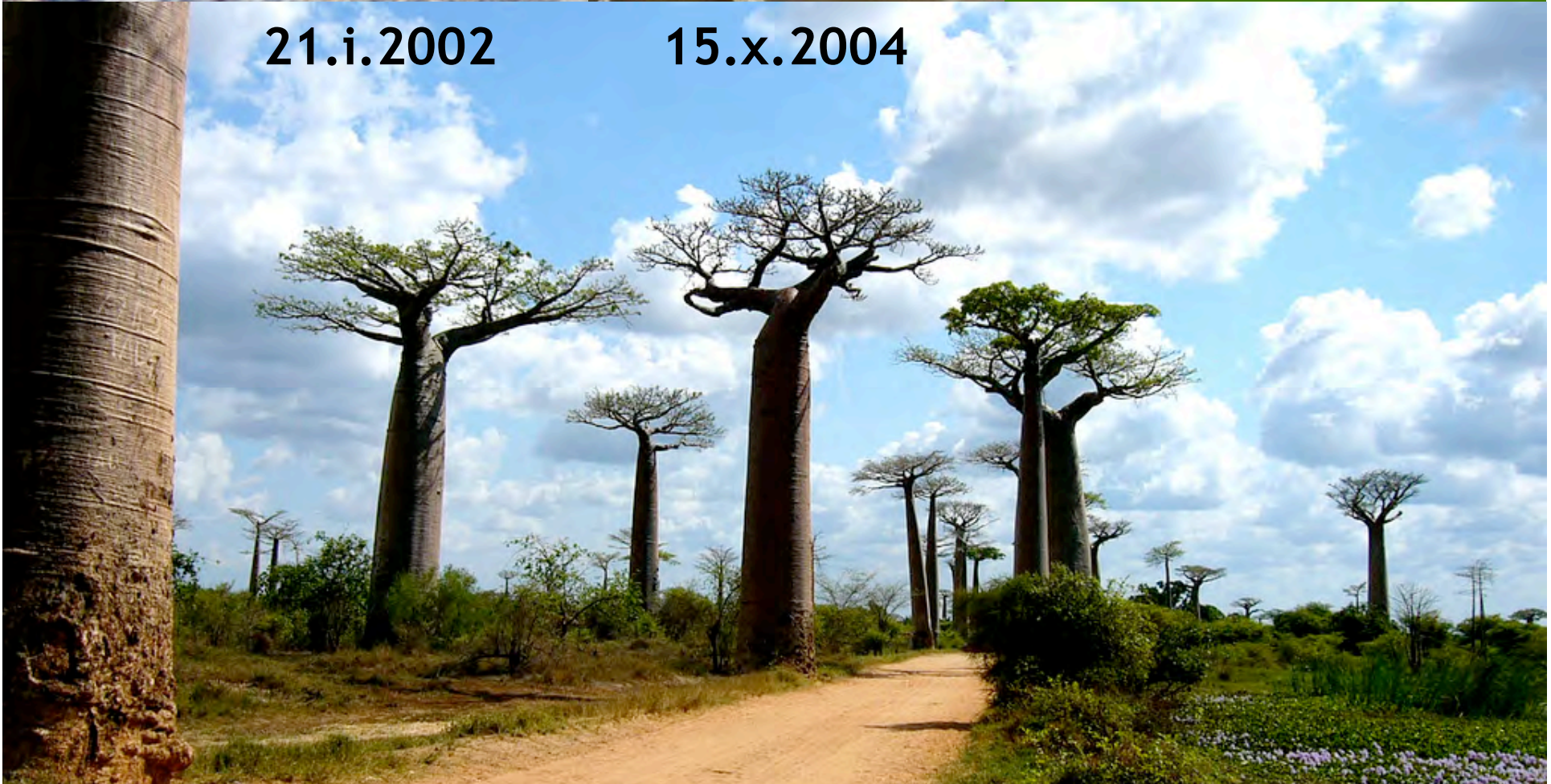
21.i.2002





21.i.2002

15.x.2004

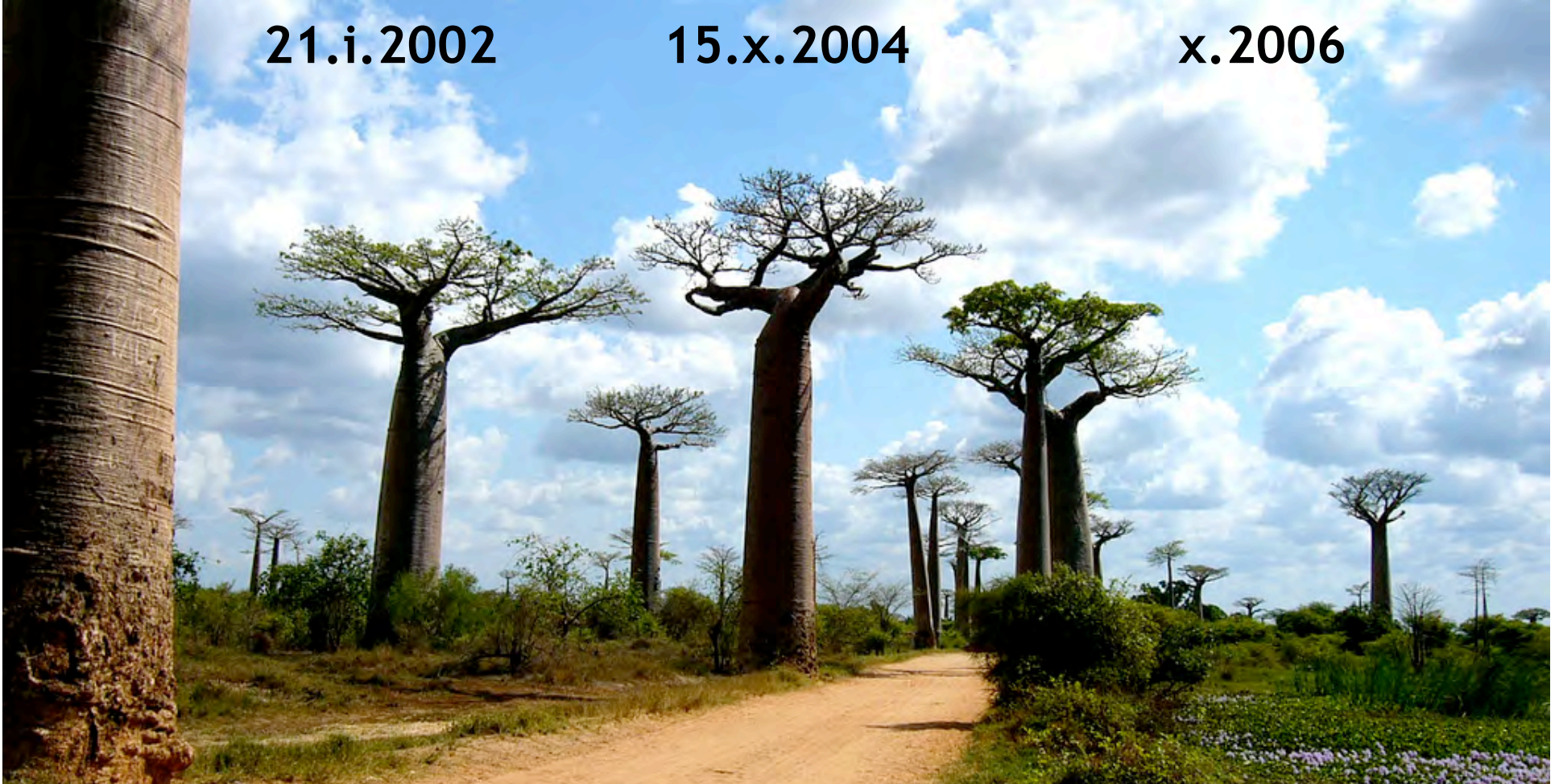




21.i.2002

15.x.2004

x.2006





**8.xi.2007
the male!**



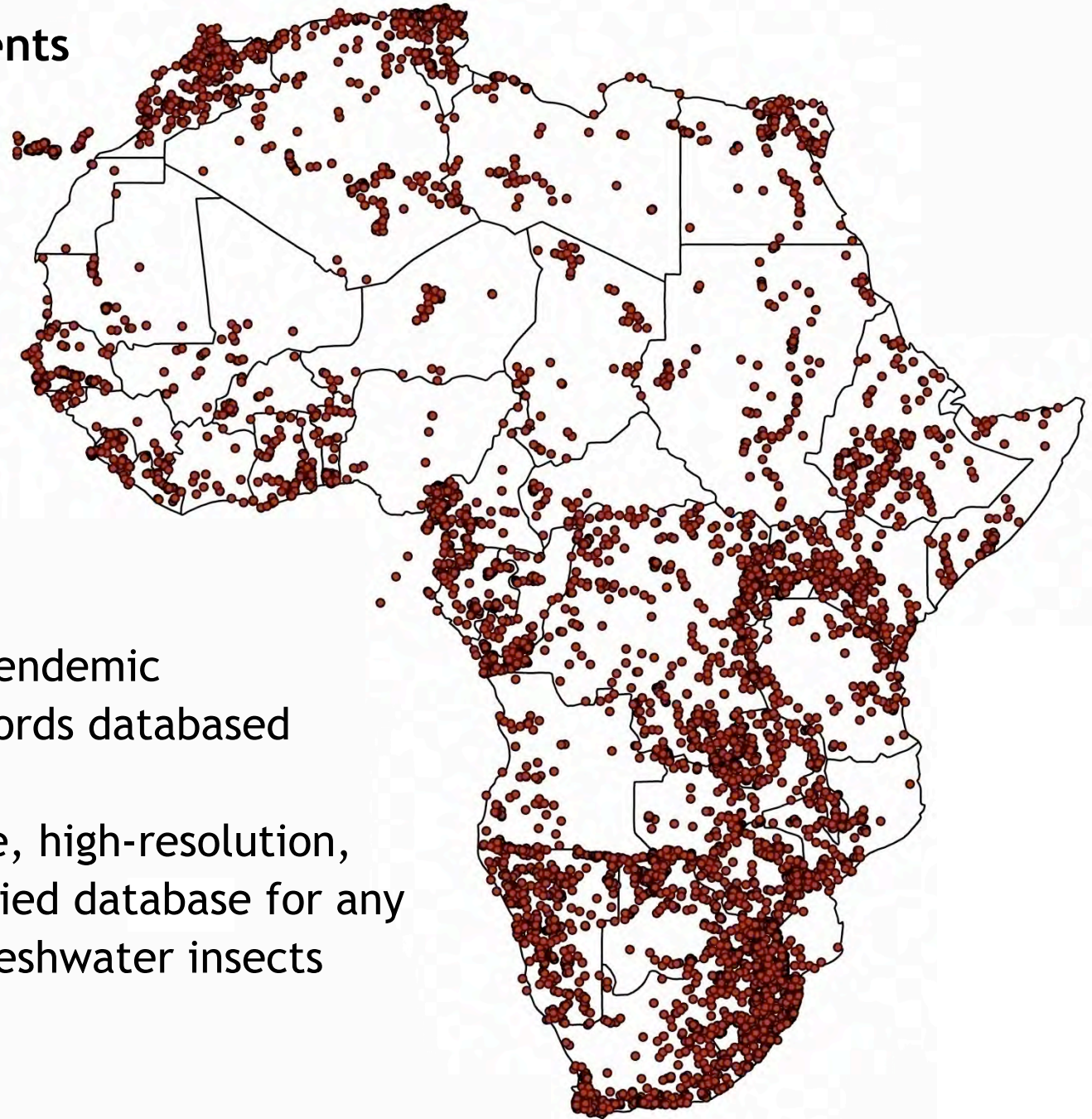
threats and
the threatened:

from the World...

... to Africa



Red List Assessments Continental Africa



700+ species; 85% endemic
almost 100,000 records databased

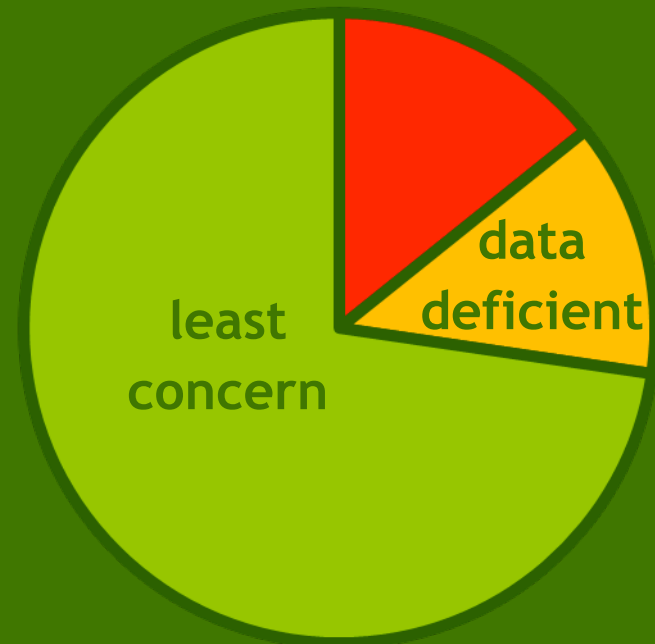
first continent-wide, high-resolution,
taxonomically-verified database for any
group of tropical freshwater insects

Red List Assessments Continental Africa

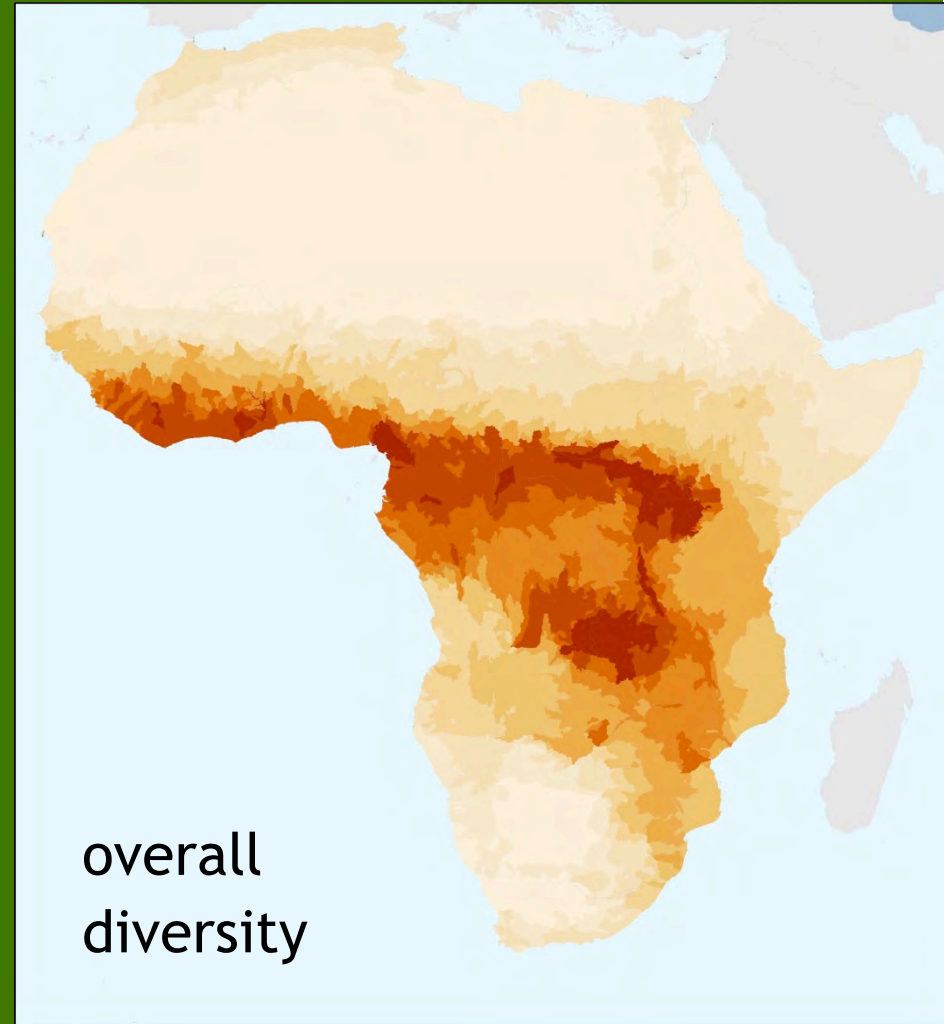
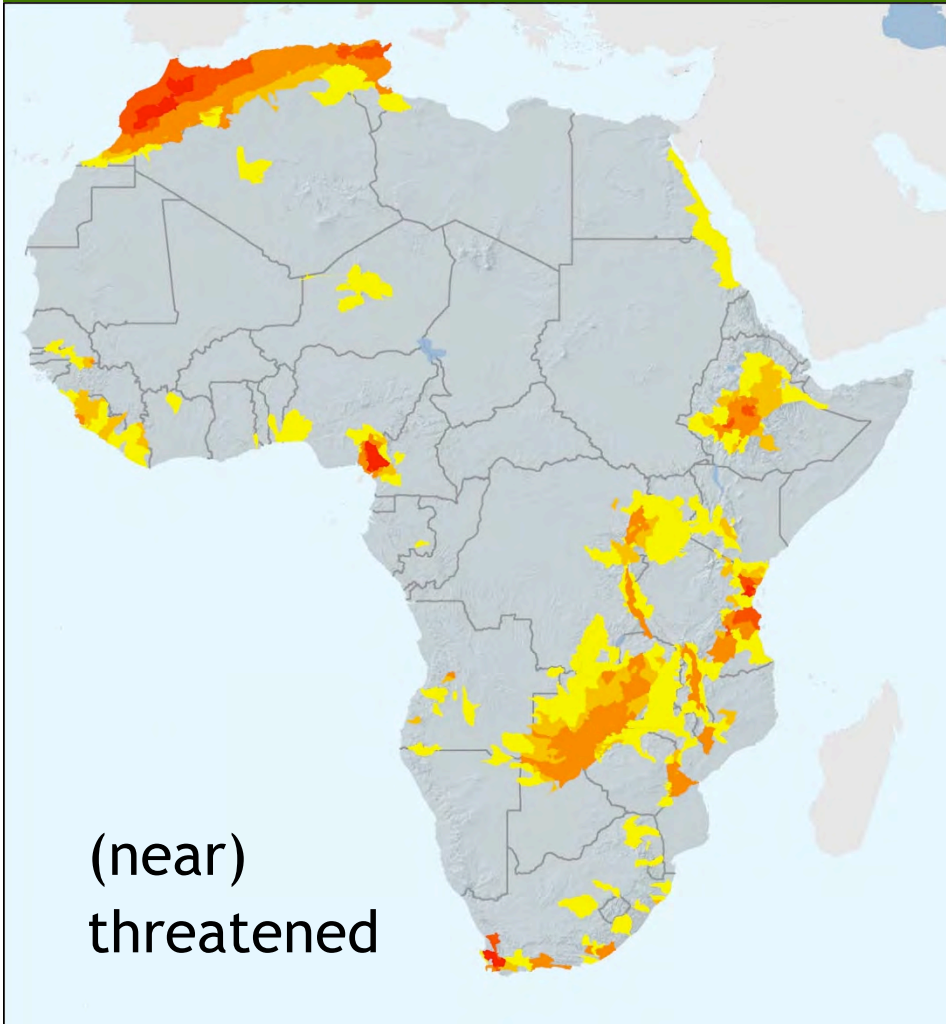
total species: 703
endemic: 85%

CRITICALLY ENDANGERED	18
ENDANGERED	16
VULNERABLE	39
NEAR THREATENED	27
DATA DEFICIENT	92
LEAST CONCERN	511

100 species (near) threatened: 14%



African Continent





Umma declivium (VU)
Tanzania



Metacnemis valida (VU)
South Africa



Pseudagrion bicoerulans (VU)
Kenya



Chlorolestes elegans (VU)
Malawi, Zimbabwe



Sapho fumosa (NT)
Sierra Leone, Liberia

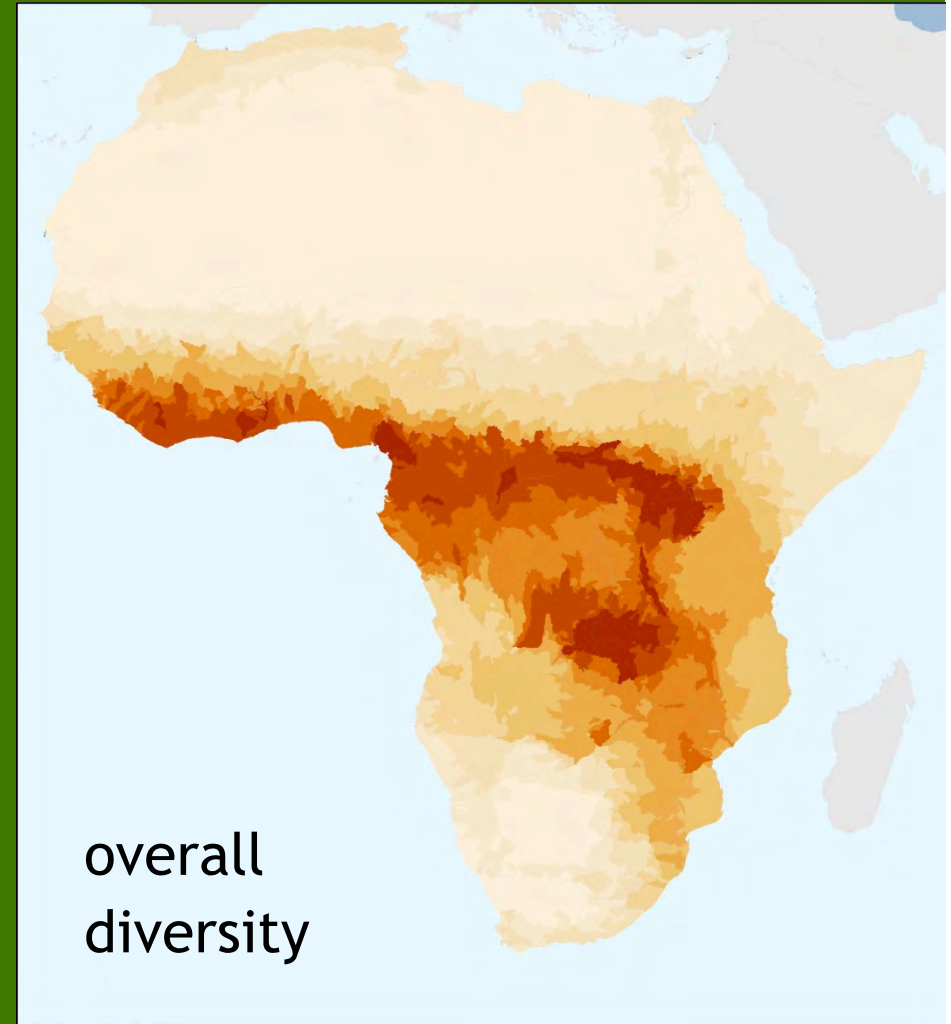


Chlorocypha centripunctata (VU)
Cameroon



Botswana, Zambia:

Anax bangweuluensis (DD > NT)



Ictinogomphus dundoensis (DD > LC)



main threat: habitat degradation and deforestation

Odonata require diverse and structured habitats for their survival

morphological diversity of a single river's streambed can create different freshwater habitats, like rapids, pools and swamps; gallery forests provide shelter, e.g. in the dry season



threatened assemblages

Ethiopian Highlands: extreme human pressure

VIOLA CLAUSNITZER & KLAAS-DOUWE B. DIJKSTRA, The dragonflies of Ethiopia

The dragonflies (Odonata) of Ethiopia, with notes on the status of endemic taxa and the description of a new species

● VIOLA CLAUSNITZER & KLAAS-DOUWE B. DIJKSTRA

Abstract. In March 2004 the authors undertook a survey of Odonata in the highlands of central and southwest Ethiopia, as well as along some Rift Valley lakes. The endemic species were the main target, as almost no information other than descriptions existed. Some type localities were visited, as were other habitats, to gather information on the species' distribution, habitat requirements and conservation status. 29 sites were sampled and 69 species recorded. Of eleven known endemics, nine were found, all at sites other than their type localities. One new species assumed to be endemic was found, and is described as *Paragomphus crenigomphoides* sp. nov. A revised checklist of Ethiopian Odonata is presented: 96 species have been reliably recorded. *Ischnura hilli* PINHEY, 1964 and *Enallagma caputavis* TERZANI & CARLETTI, 1998 are considered synonyms of *I. abyssinica* MARTIN, 1907 and *Pseudagrion niloticum* (MULLER, 1894) and

Zusammenfassung. Im März 2004 wurde von den Autoren eine Inventarisierung der Libellenfauna der Hochländer zentral und süd-west Äthiopiens und entlang der Rift Valley Seen durchgeführt. Das Hauptziel waren die endemischen Arten, über die so gut wie keine Information jenseits der Artbeschreibung existierte. Originalfundorte der endemischen Arten, sowie andere Habitate wurden aufgesucht, um Daten zu Verbreitung, Habitatansprüchen und zum Schutzstatus zu bekommen. 69 Arten wurden an 29 aufgesuchten Lokalitäten nachgewiesen. Von elf bekannten endemischen Arten wurden neun gefunden, alle auch an neuen Lokalitäten. Weiterhin wird eine neue Art als *Paragomphus crenigomphoides* sp. nov. beschrieben, die ebenfalls endemisch für Äthiopien scheint. Eine revidierte Artenliste der Libellen Äthiopiens wird aufgeführt: 96 Arten sind bislang zuverlässig für Äthiopien nachgewiesen. *Ischnura hilli* PINNEY, 1964 und

Introduction

With about 1,100,000 km² Ethiopia is one of Africa's largest countries. The topography is very diverse, ranging from mountains over 4000 m above sea level to the Danakil Depression 120 m below it. The main topographic feature is the vast and fertile central highland with an average elevation between 1500 and 2400 m; the largest block of land above 1500 m in Africa. The highlands have an annual average temperature of 16–20 °C and an annual average rainfall around 1200 mm, reaching 2400 mm in the southwest. The degree of endemism in Ethiopia's flora and fauna is exceptionally high. This is largely the result of the isolation of the vast highlands by the surrounding dry lowlands. The species that Ethiopia shares with tropical Africa tend to be restricted to the most versatile and mobile forms. These are mainly montane species. Most of Ethiopia's endemic species also belong to the Afrotropical Highlands biome (KINGDON 1989). Despite the many endemic species in

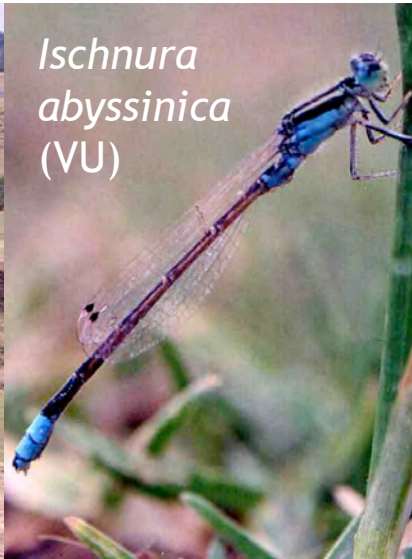
species

recorded 100

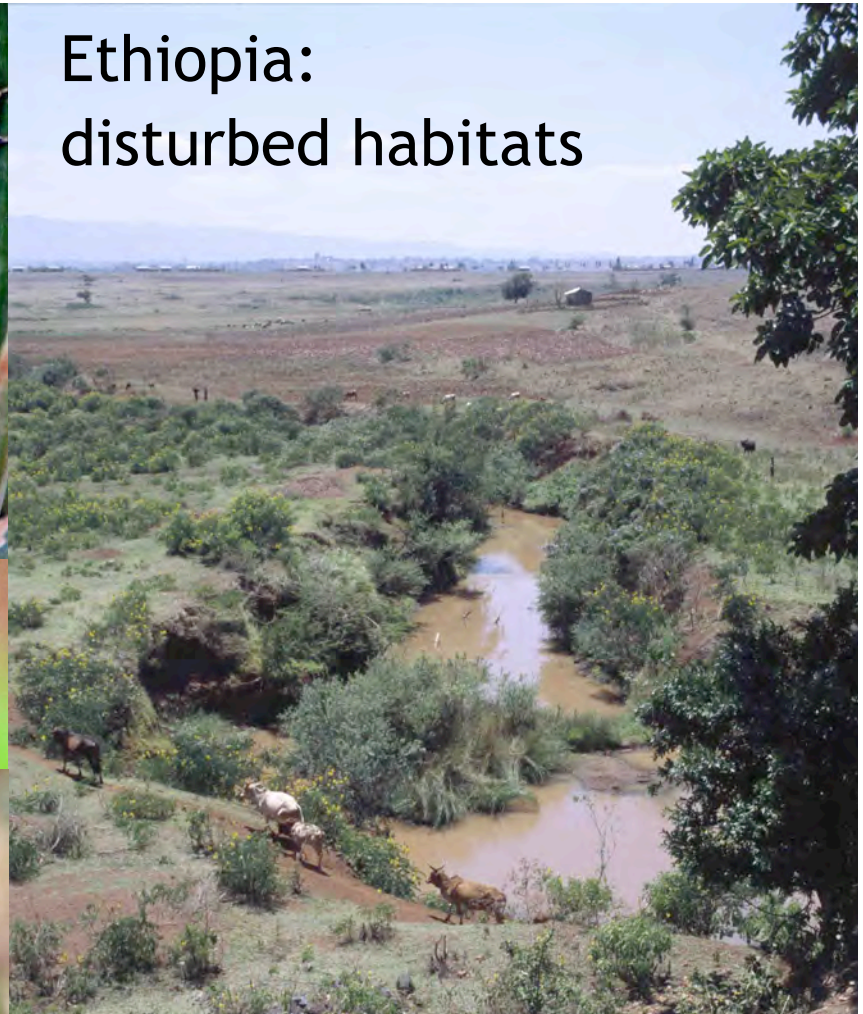
endemic 12

threatened 9





*Ischnura
abyssinica*
(VU)



Ethiopia: disturbed habitats



*Pseudagrion
kaffinum*
(VU)



*Orthetrum
kristenseni* (LC)



Elatoneura pasquinii (VU)

Ethiopia:
natural habitats



Notogomphus cottarellii (EN)

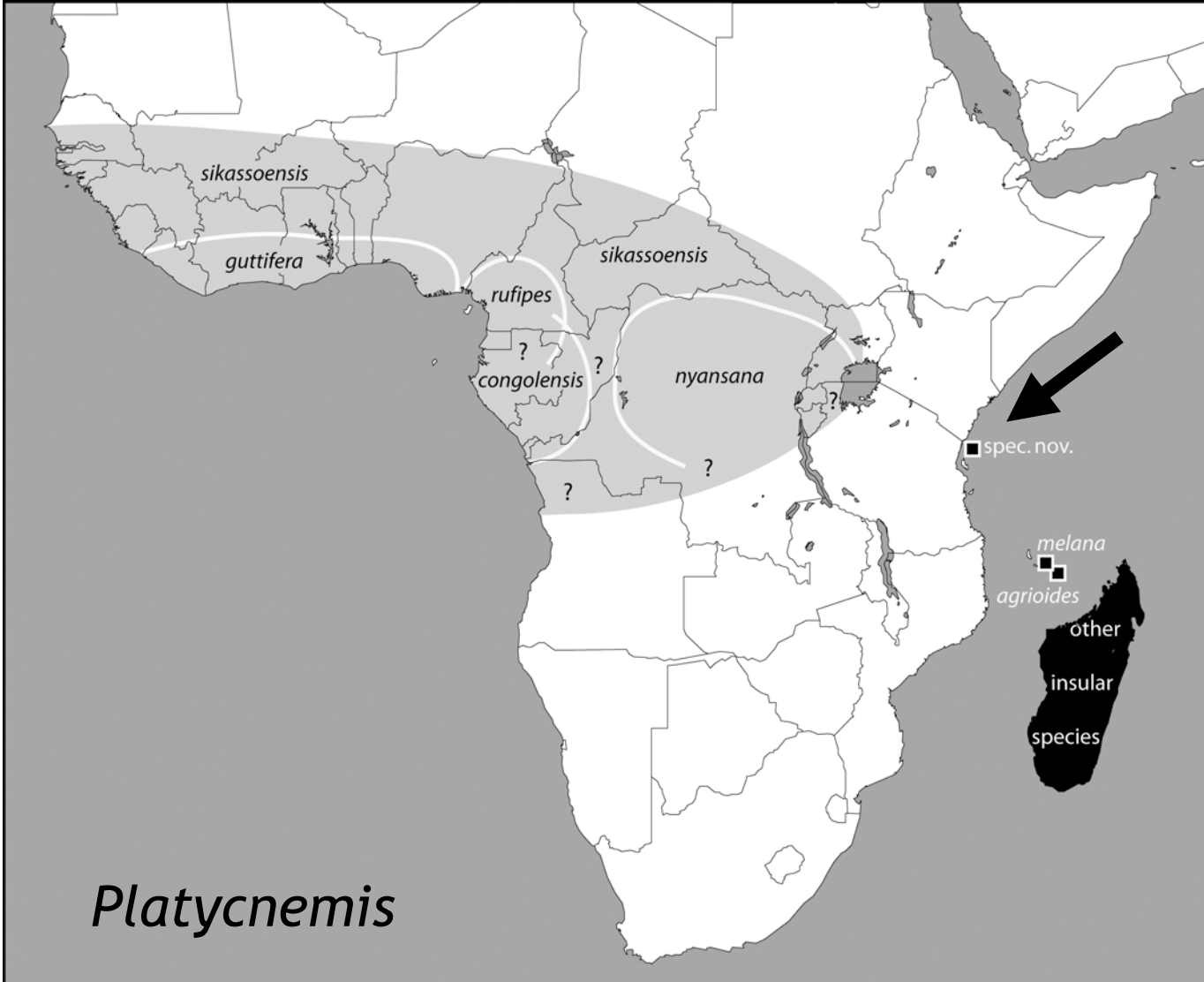
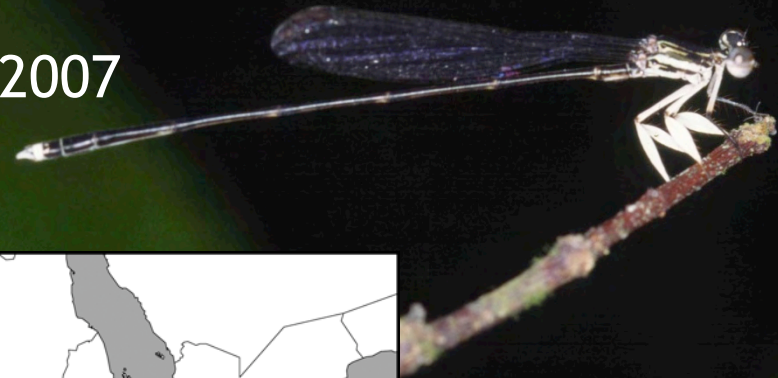


Atoconeura aethiopica (VU)



Pseudagrion guichardi (VU)

Platycnemis pembipes
Dijkstra, Clausnitzer & Martens, 2007
CRITICALLY ENDANGERED



only in one
stream on
Pemba island

closely related to
Madagascar species,
separated by
1000 km of sea

mainland group of
Platycnemis not
closely related



Colour plate 1: *Notogomphus maathaiae* sp. nov. — (a) Holotype male, Mt Elgon National Park, Kenya, 6 June 2000. — (b) Type locality at the Rongai River in Mt Elgon National Park, Kenya, 6 January 2001. Photos: Viola Clausnitzer.

Notogomphus maathaiae ENDANGERED

restricted to forest streams of Kenya highlands

Received 03 May 2005; revised and accepted 25

Honouring Nobel Peace Prize winner Wangari Maathai *Notogomphus maathaiae* sp. nov., a threat to Kenya's forest streams (Odonata: Libellulidae)

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Key words: Odonata, dragonfly, *Notogomphus maathaiae*, montane forest, Kenya, Africa.

ABSTRACT

Notogomphus maathaiae sp. nov. (holotype ♂: Kenya, Western Province, Mt Elgon District, Mt Elgon, Rongai River, 2,361 m a.s.l., 1°02'19.4"N, 34°45'20.5"E, 06 vi 2000) is described from a series of 8 males and 3 females collected at montane forest streams in Kenya. The status and biogeography of this and other





damming



mining





Mt Mulanje, S Malawi



Oreocnemis phoenix
CRITICALLY ENDANGERED

genus endemic to one plateau

world range of 50 km²

threat of bauxite mining

extreme isolation

highest mountain (3002 m)
between Kilimanjaro and
Drakensberg (3000 km gap)

Mt Mulanje, S Malawi

rises from 700 m plain to 24 km
wide plateau at 2000 m a.s.l.



water extraction and pollution

natural aquatic habitats and their inhabitants are under pressure by increasing human demand for water especially in arid environments

North Africa

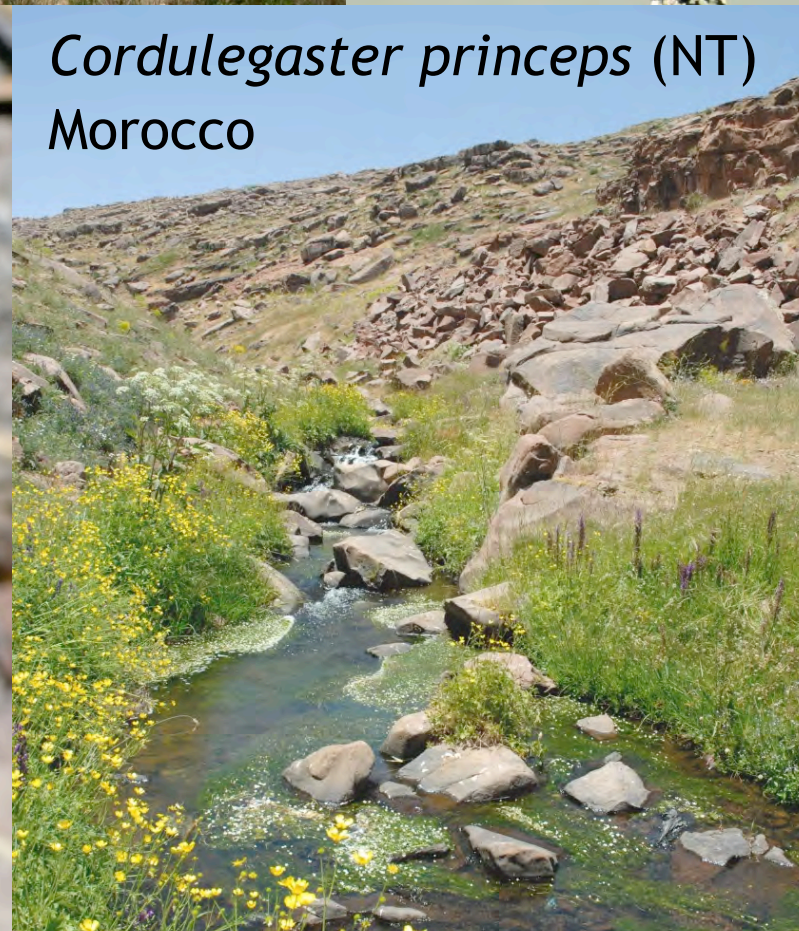
Azuragrion granti (NT) Socotra



Calopteryx exul (EN) Algeria



Cordulegaster princeps (NT)
Morocco





alien plants and fish (South Africa)

invasive trees may overgrow the natural vegetation along streams completely: some threatened endemics, like *Pseudagrion newtoni* (VU), are only known from sites where alien trees have been removed

rapid biodiversity (or environmental impact) assessments

		funder	concern
DR Congo	2004	USA	future of oil palm plantation
Liberia	2005	EU	conservation plan national forests
Ghana	2006	Alcoa	mining for bauxite
Tanzania	2009	USA	hydro-electric plant
DR Congo	2010	Belgium	national biodiversity centre
Liberia	2010	ArcelorMittal	mining for iron ore



rapid biodiversity (or environmental impact) assessments

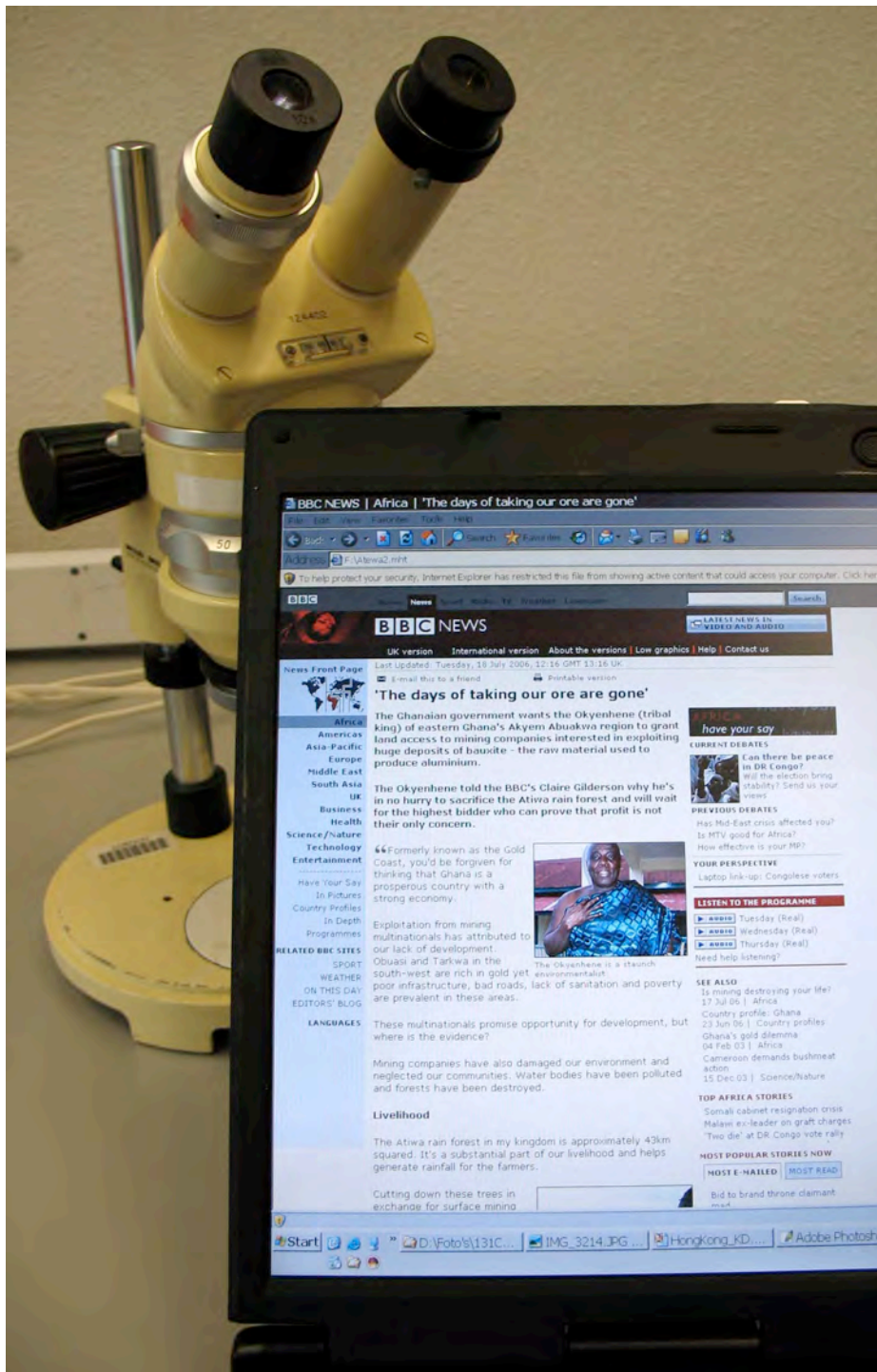
	survey days	species	... of which
DR Congo	13	86	2 new to science
Liberia	26	92	7 new for Liberia
Ghana	12	72	8 new for Ghana
Tanzania	13	88	6 new for Tanzania
DR Congo	33	162	7 new to science
Liberia	18	105	19 new for Liberia



RAP

Ghana





'The days of taking our ore are gone'

The Ghanaian government wants the Okyenhene (tribal king) of eastern Ghana's Akyem Abuakwa region to grant land access to mining companies interested in exploiting huge deposits of bauxite - the raw material used to produce aluminium.

The Okyenhene told the BBC's Claire Gilderson why he's in no hurry to sacrifice the Atiwa rain forest and will wait for the highest bidder who can prove that profit is not their only concern.

“Formerly known as the Gold Coast, you'd be forgiven for thinking that Ghana is a prosperous country with a strong economy.



The Okyenhene is a staunch environmentalist

Exploitation from mining multinationals has attributed to our lack of development. Obuasi and Tarkwa in the south-west are rich in gold yet poor infrastructure, bad roads, lack of sanitation and poverty are prevalent in these areas.

Mining companies have also damaged our environment and neglected our communities. Water bodies have been polluted and forests have been destroyed.

Livelihood

The Atiwa rain forest in my kingdom is approximately 43km squared. It's a substantial part of our livelihood and helps generate rainfall for the farmers.



Sapho ciliata - lowest desirability:
inhabits any running water with some open
spots, being typical of disturbed sites



Umma cincta - low desirability:
mostly in sandy and gravelly, typically calmer,
running waters, with at least some shading



Sapho bicolor - high desirability:
favours smallest, shadiest streams, e.g. close to
source; depends on reasonably closed canopy



Sapho fumosa - highest desirability:
near-threatened regional endemic confined to
swift (most numerous near small falls), rocky and
(partly) forested streams

