



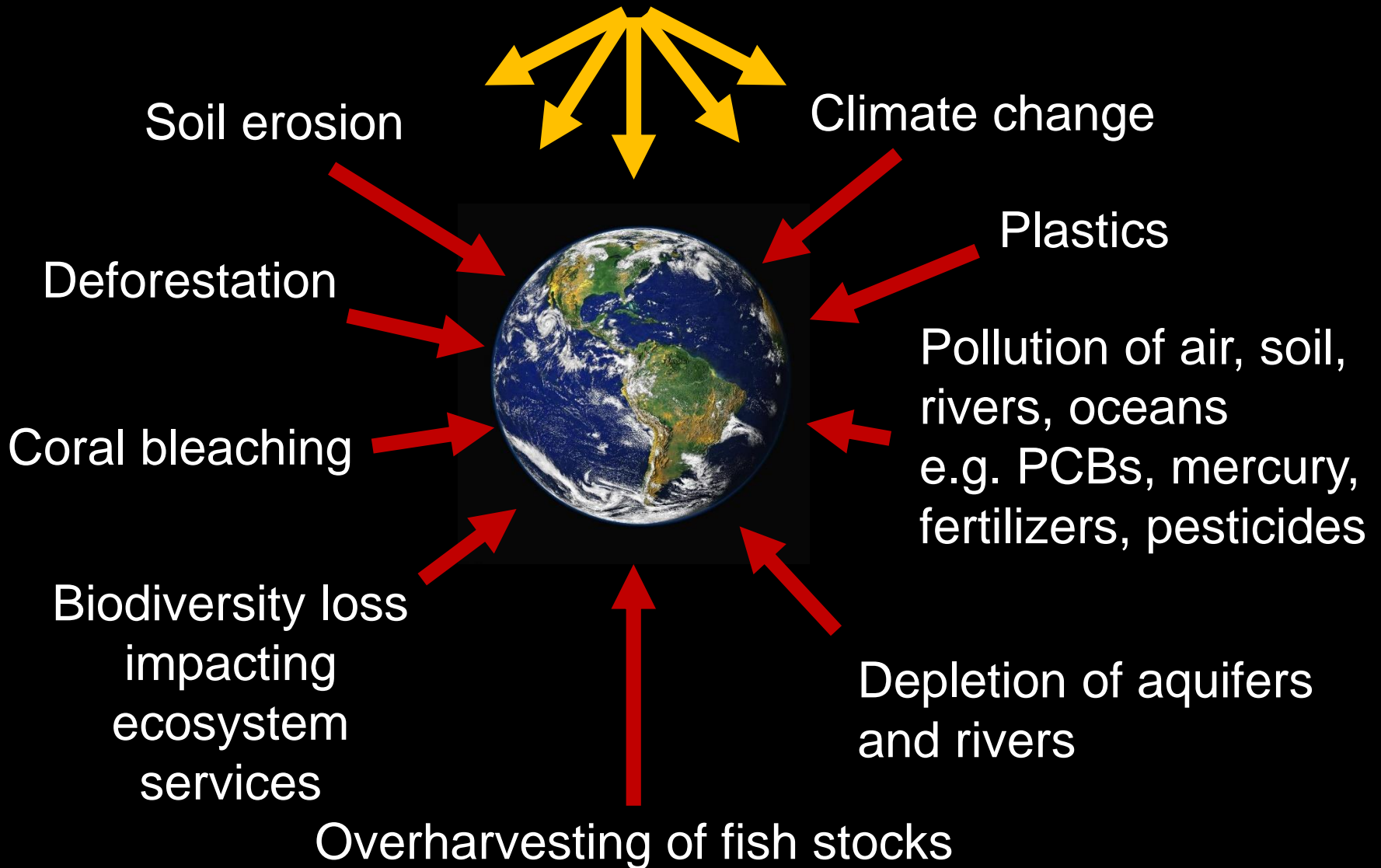
Save our Insects

Prof Dave Goulson
University of Sussex
[@DaveGoulson](https://twitter.com/DaveGoulson)

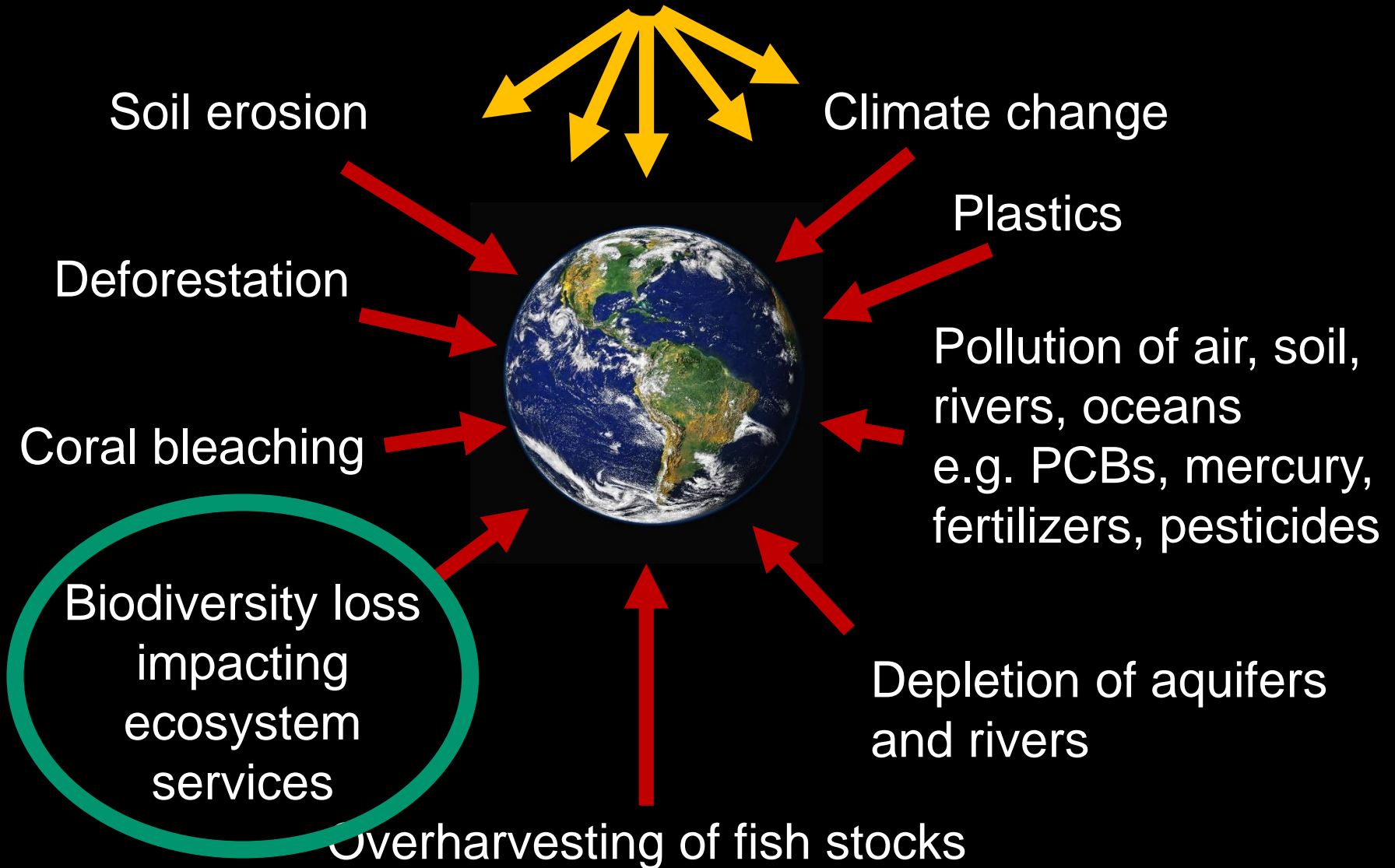




Human population growth

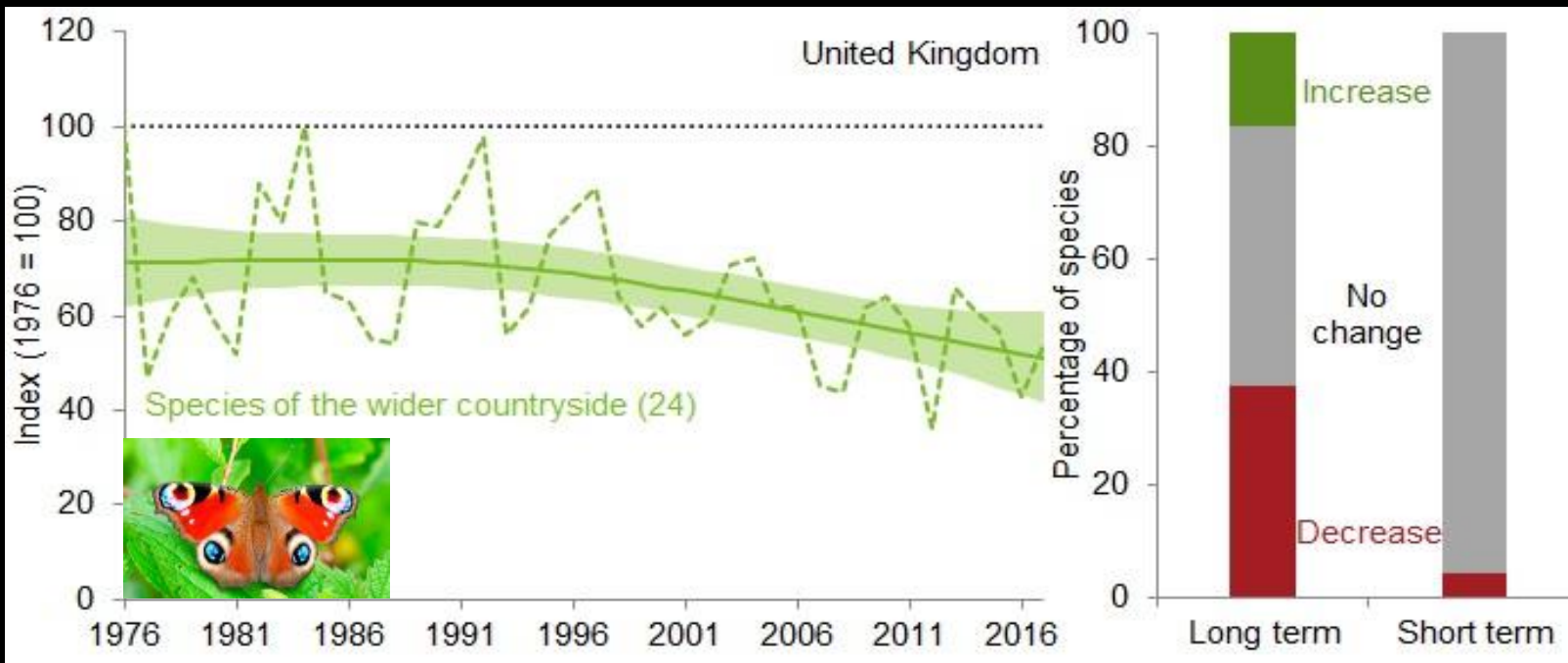


Human population growth

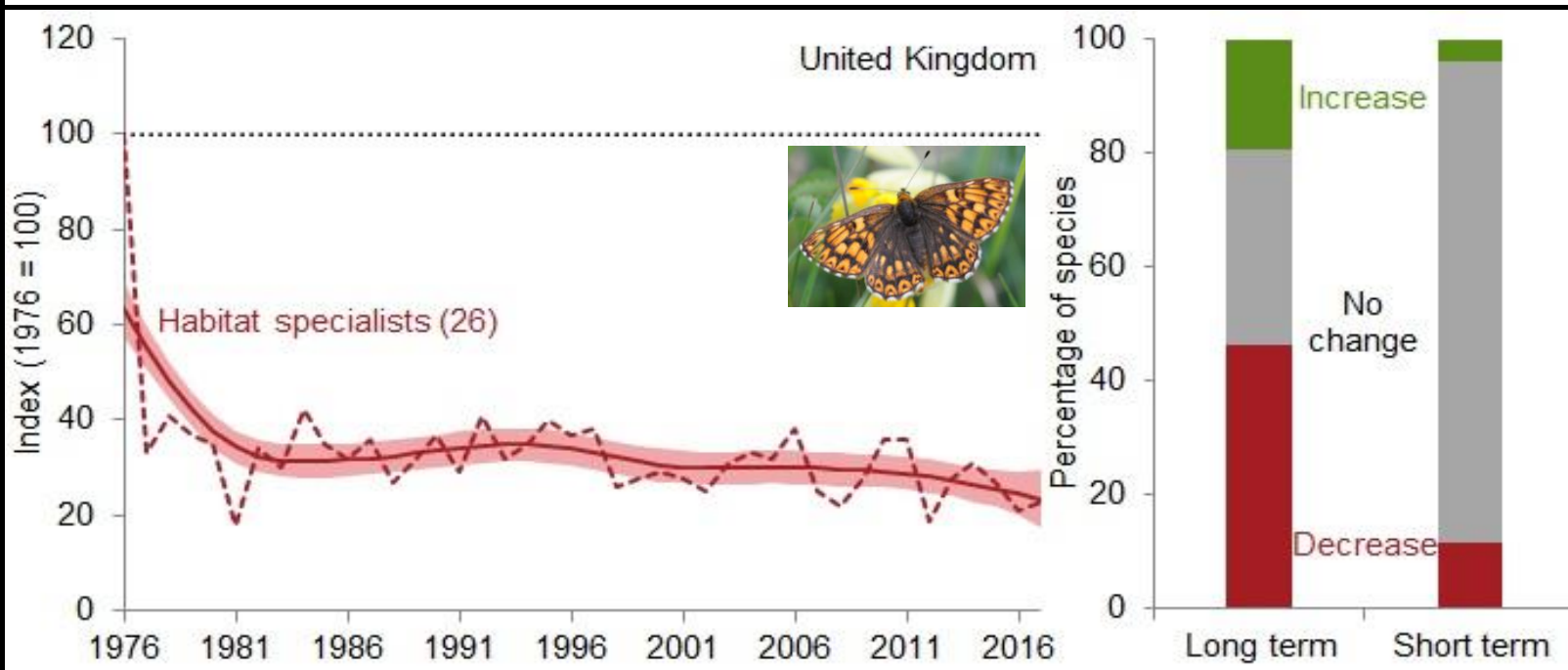


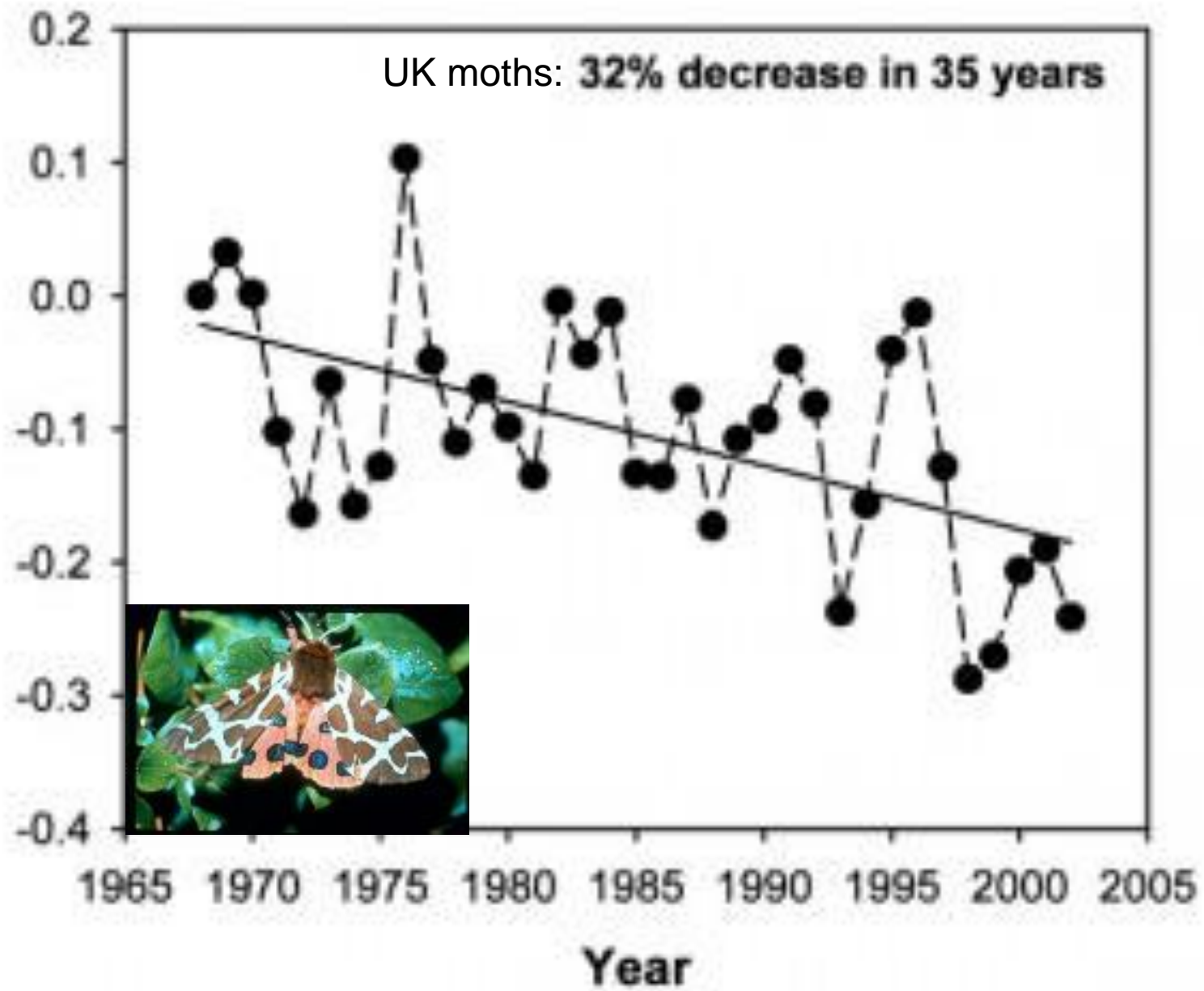
Evidence for insect declines

↓46%
in 32
years

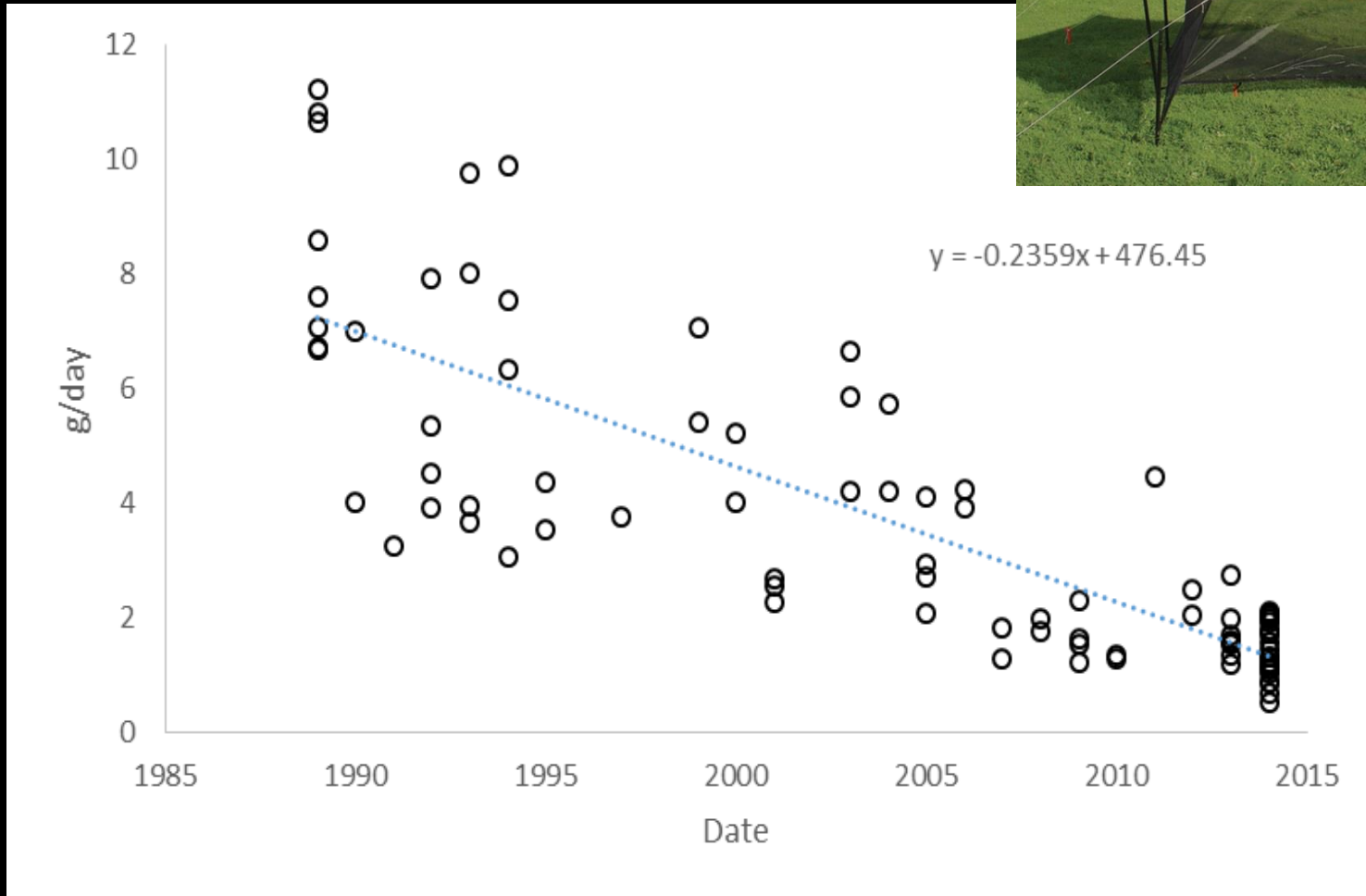


↓77%
in 32
years

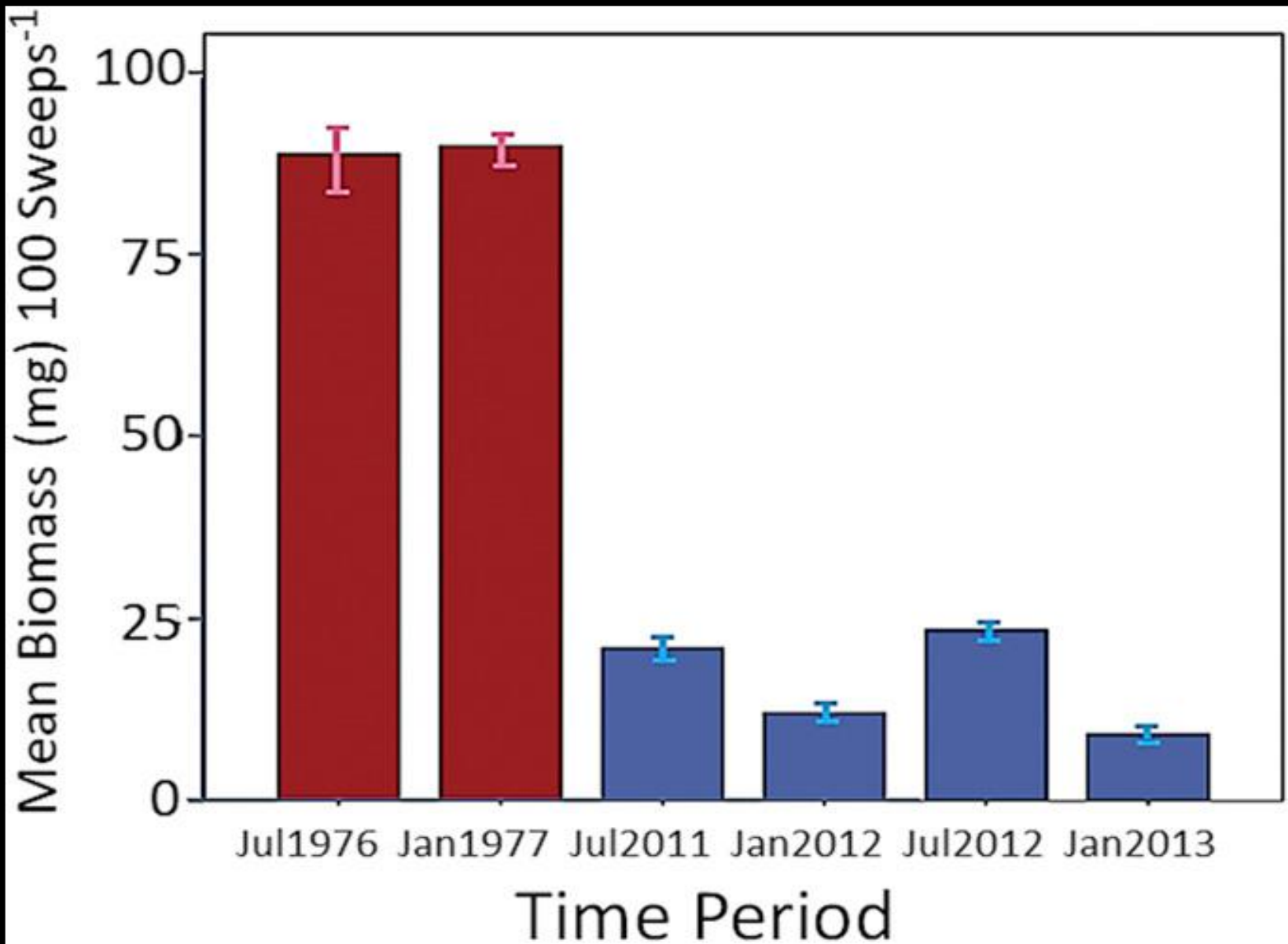




Catch per day (grams of insects) in Malaise traps deployed at 63 sites in Germany between 1989 and 2014.



Hallmann, CA, ... Goulson, D & de Kroon, H. 2017. More than 75 percent decline over 27 years in total flying insect biomass in protected areas. PlosONE 12: e0185809.



Biomass in sweep net samples. From Lister and Garcia 2018 PNAS

Why does loss of insects matter?

“If all mankind were to disappear, the world would regenerate back to the rich state of equilibrium that existed ten thousand years ago. If insects were to vanish, the environment would collapse into chaos.”

E O Wilson

What have insects ever done for us?

- Pollination
- Recycling of dung & leaves
- Corpse disposal
- Seed dispersal
- Soil health
- Pest controllers
- Food for birds, bats, lizards, amphibians etc.,





Causes of declining insects?

Disease

Loss of habitat

Pesticides

Climate change





Loss of habitat

37 0141
Bougainville, Picardy
Street View - Mar 2011



Navigation and utility icons including a compass, zoom in (+) and zoom out (-) buttons, a settings gear icon, and a "Hide imagery" toggle.

← Iram Drive
Willingham, England
Street View - Sep 2008



📍 ⚙️ ⏪ ⏩ Hide Imagery

Tjongeravlei
Naussehorre, Friesland
Street View - Jul 2009



40 Oosthoekstraat
Tielt, Flanders
Street View - Aug 2009



Navigation controls including a compass, zoom in (+) and zoom out (-) buttons, a settings gear icon, and a 'Hide imagery' toggle.

521

Skane County

Street View - Jul 2011



Hide imagery



4988 Co Rd F62

Jones City, Iowa

Street View - Oct 2012





Pesticides

Pesticides

Agrochemical applications on an oilseed rape field in Sussex

25/08/2012	Insecticide and fungicide	Cruiser	280 g/l thiamethoxam, 8 g/l fludioxonil and 32.3 g/l metalaxyl-M	Seed dressing
28/08/2012	Herbicide	Shadow	Quinmerac, Dimethenamid-p, Metazachlor	Spray
	Herbicide	Dictate	480g/litre bentazone as sodium salt in the form of soluble concentrate	Spray
	Fungicide	Fiddle	Clomazone	Spray
08/09/2012	Molluscicide	Tds Major	Metaldehyde	Slug pelleter
12/09/2012	Herbicide	Shadow	Quinmerac, Dimethenamid-p, Metazachlor	Spray
10/10/2012	Herbicide	Crawler	Carbetamide	Spray
05/11/2012	Fungicide	Genie 25	Flusilazole	Spray
	Insecticide	Gandalf	Beta-cyfluthrin	Spray
16/02/2013	Fertiliser	Double Top	Ammonium Sulphate and Ammonium Nitrate	Fertiliser spreader
	Herbicide	Crawler	Carbetamide	Spray
	Herbicide	Pilot Ultra	Quizalofop-P-ethyl	Spray
10/04/2013	Fertiliser	Nitram	Ammonium nitrate	Fertiliser spreader
22/04/2013	Fertiliser	Nitram	Ammonium nitrate	Fertiliser spreader
17/05/2013	Fungicide	Filan	Boscalid	Spray
	Fungicide	Flanker	Picoxystrobin	Spray
	Insecticide	Alert	Alpha-cypermethrin	Spray
05/06/2013	Fungicide	Propulse	Fluopyram, Prothioconazole	Spray
	Insecticide	Hallmark Zeon	100 g/l lambda-cyhalothrin and 1,2-benzisothiazolin-3-one	Spray
	Insecticide	Gandalf	Beta-cyfluthrin	Spray
	Insecticide	Mavrik	Tau-fluvalinate	Spray



£8.99

£7.99

£8.99

£8.99

£7.99

£8.99

£3.99

£7.99

£5.99

£3.99

£7.99

£5.99

£3.99

£5.99

£4.99



POISON

KEEP OUT OF REACH OF CHILDREN
READ SAFETY DIRECTIONS
FOR ANIMAL TREATMENT ONLY



advocate[®]

for Dogs 10-25kg

100g/L IMIDACLOPRID, 25g/L MOXIDECTIN

Fleas, heartworm & worms

Once a month topical flea and worm treatment

- Stops fleas feeding in 3-5 minutes
- Prevents heartworm and controls intestinal worms and larvae



WATER RESISTANT
FORMULATION



Fleas



Flea larvae



Heartworm



Intestinal
worms



Intestinal
worm larvae



Demodectic
mange



Sarcoptic
mange



Ear mites

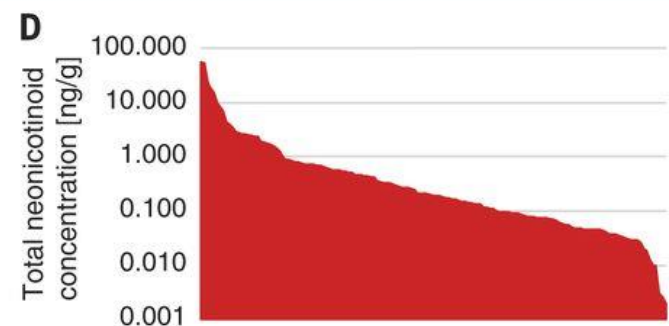
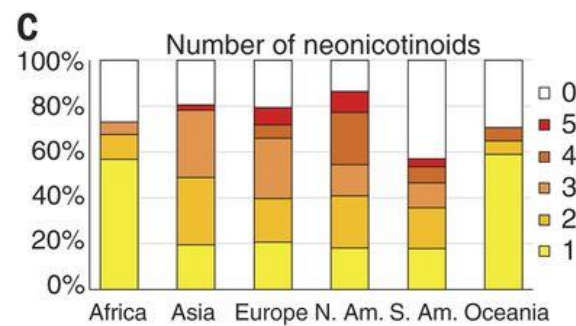
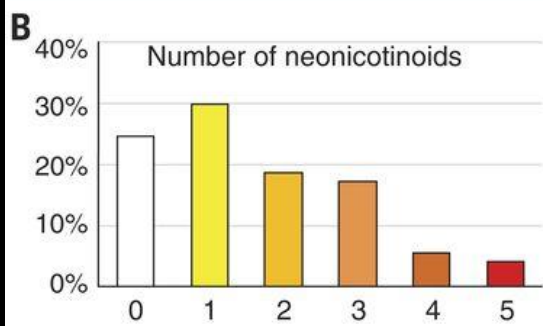
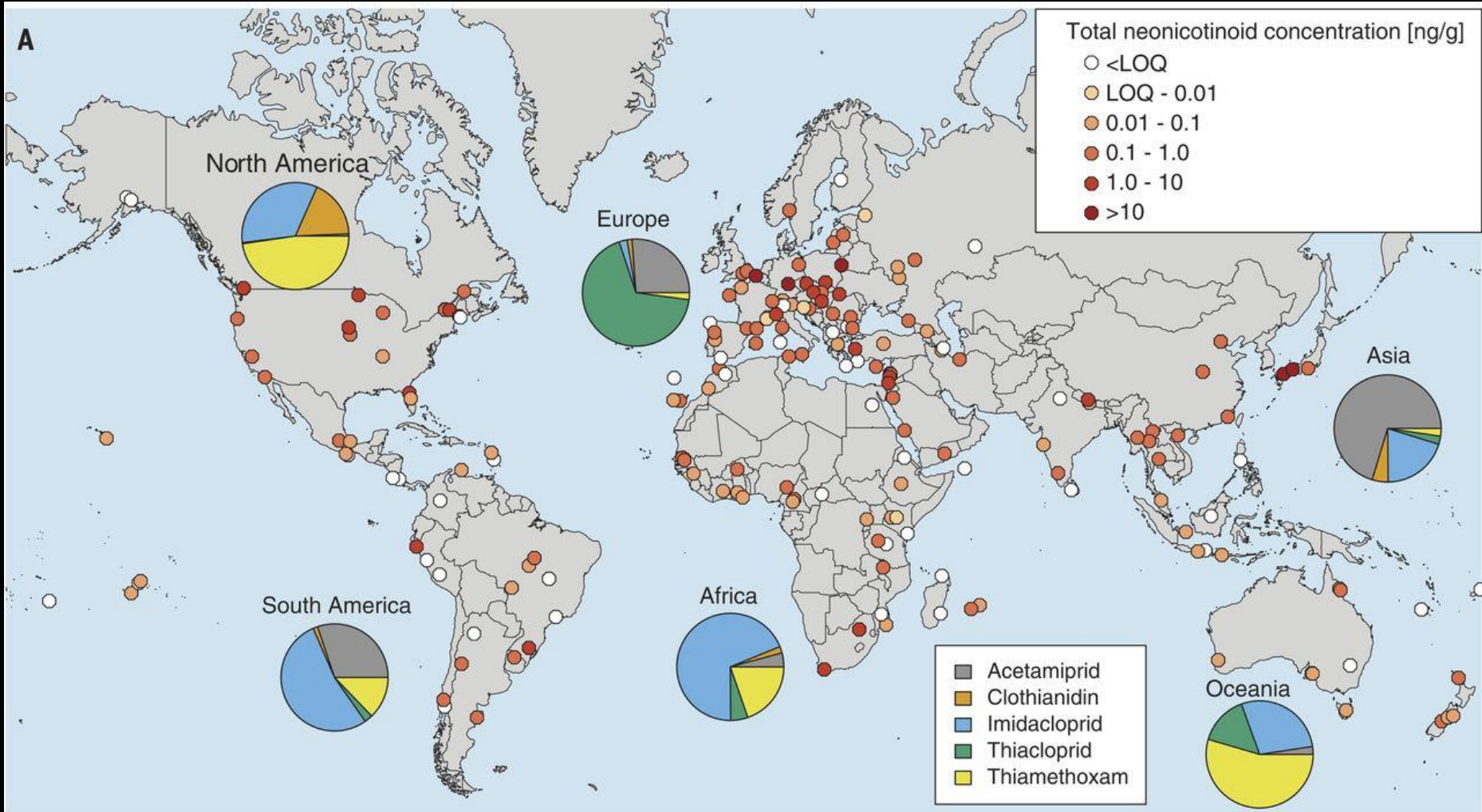


Lice



3

x 2.5mL
tubes



Limited / monotonous floral resources

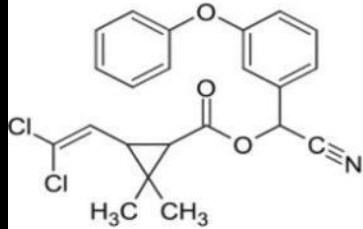
Lack of alternative forage may increase exposure to pesticides



Poor diet compromises immunity

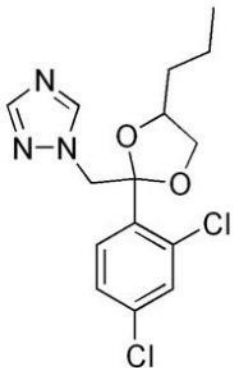
Immune response energetically costly

Pyrethroids



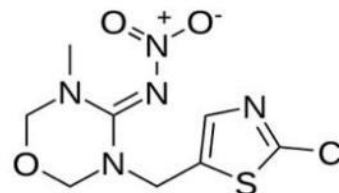
Fungicides increase toxicity

EBI Fungicides



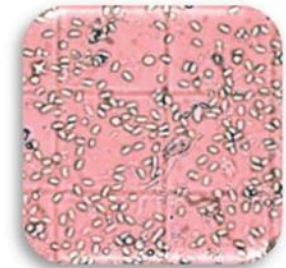
Fungicides act synergistically to increase toxicity

Neonicotinoids



Pesticide exposure affects disease tolerance and susceptibility

Parasites + Pathogens



What can we do?



What can we do?

Promote wildlife-
friendly gardening

Turn our cities, towns
and villages into a
network of insect
reserves



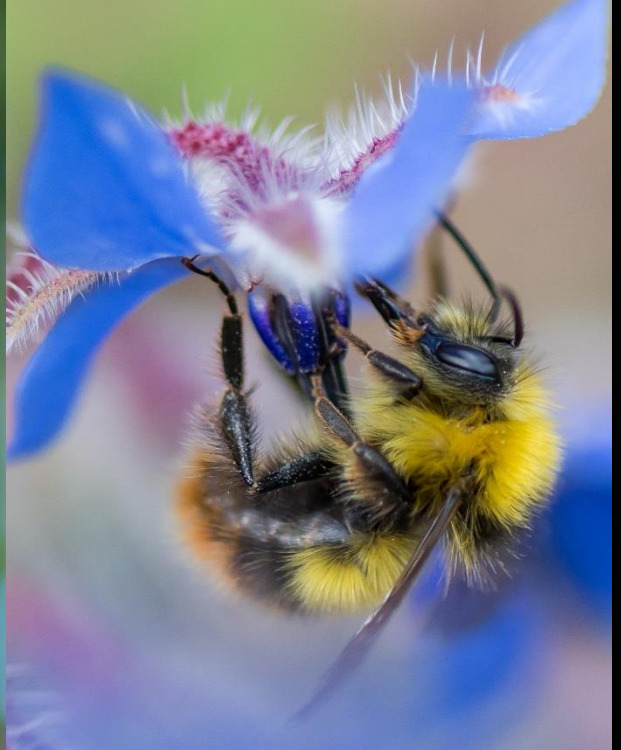
Mow less!



Choose the right flowers.....







50x more bumblebees, 13x as many hoverflies, Blackmore & Goulson 2014







What about farming?

Is this approach to farming the only way
to feed the world?



Organic?



3lb
£12

SIRLOIN STEAK £7.49
£16.51

FINEST ENGLISH T-BONE STEAKS £5.99
£13.18

FRESH EXTRA LEAN DICED BEEF £3.69
2lb FOR £6.50

FINEST SCOTCH FILLET STEAK £10.99
£24.22

RIBEYE STEAKS £7.99
£17.41

2lb FOR ONLY £6.50

FINEST EXTRA LEAN STEAK MINCE £2.79
2lb FOR £5

FRESH ENGLISH DOUBLE LAMB CHOPS £4.99
3lb FOR £10

FRESH ENGLISH LAMB CHUMP CHOPS £5.99
2lb FOR £9.99

3lb FOR ONLY £24.99

FRESH ENGLISH STEWING STEAK £2.49
4.50

2lb FOR ONLY £9.10.50

11.87

10.50

11.59

24.99

23.80

14.79



UK: 27% of adults obese; 63% overweight; 20% of 10-11 yr olds obese; costs economy £27 billion

Alternative modes of food production:
Encourage/ support/
promote allotmenting
& home veg growing:



Can farming learn
from this?









“Save a bee today;
save the world tomorrow”

