Plénière du COS
Lundi 12 décembre 2019

Quelques articles phares de 2019
« Après le rapport IPBES, où en est la biodiversité ?»

Une sélection subjective et non exhaustive

Jean-François Silvain
Président de la FRB

Membres Fondateurs de la FRB :

FONDATION POUR LA RECHERCHE SUR LA BIODIVERSITÉ

La biodiversité s'effondre, épisode 28 : les insectes

Souvenez-vous, en 2017…

RESEARCH ARTICLE

More than 75 percent decline over 27 years in total flying insect biomass in protected areas

Caspar A. Hallmann[1]*, Martin Sorg[2], Eelke Jongejans[1], Henk Siepel[1], Nick Hofland[1], Heinz Schwan[2], Werner Stenmans[2], Andreas Müller[2], Hubert Sumser[2], Thomas Hörren[2], Dave Goulson[3], Hans de Kroon[1]

PLOS ONE | https://doi.org/10.1371/journal.pone.0185809 October 18, 2017

Et en 2018…

Climate-driven declines in arthropod abundance restructure a rainforest food web

Bradford C. Lister[a,1] and Andres Garcia[b] PNAS | vol. 115 | no. 44 | E10397–E10406

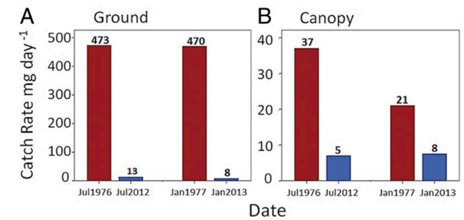


Fig. 4. Comparison of the average dry-weight biomass of arthropods caught per 12-h day in 10 ground (*A*) and canopy (*B*) traps within the same sampling area in the Luquillo rainforest. Numbers above the bars give the mean daily catch rate in dry weight of arthropods per day for the respective dates. Data for 1976 and 1977 are from Lister (22).

2019…

Review

Worldwide decline of the entomofauna: A review of its drivers

Francisco Sánchez-Bayo[a,*], Kris A.G. Wyckhuys[b,c,d]

Biological Conservation 232 (2019) 8–27

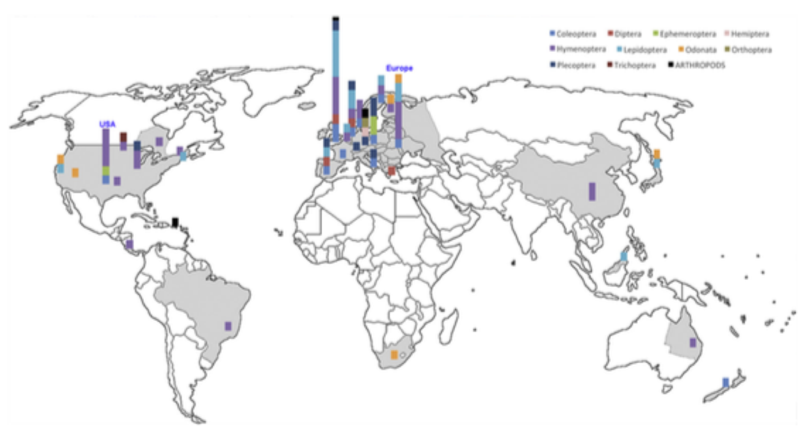


Fig. 1. Geographic location of the 73 reports studied on the world map. Columns show the relative proportion of surveys for each taxa as indicated by different colours in the legend. Data for China and Queensland (Australia) refer to managed honey bees only. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

La biodiversité s’effondre, épisode 28 : les insectes

2019…

Conservation

Robust evidence of insect declines

William E. Kunin

Data are mounting that document widespread insect losses. A long-term research project now provides the strongest evidence of this so far, and demonstrates the value of standardized monitoring programmes. **See p.671**

Nature | Vol 574 | 31 October 2019 | **641**

Article

Arthropod decline in grasslands and forests is associated with landscape-level drivers

https://doi.org/10.1038/s41586-019-1684-3
Received: 8 February 2019
Accepted: 16 September 2019
Published online: 30 October 2019

Sebastian Seibold[1,2*], Martin M. Gossner[3], Nadja K. Simons[1,4], Nico Blüthgen[4], Jörg Müller[2,5], Didem Ambarlı[1,6], Christian Ammer[7], Jürgen Bauhus[8], Markus Fischer[9], Jan C. Habel[1,10], Karl Eduard Linsenmair[11], Thomas Nauss[12], Caterina Penone[9], Daniel Prati[9], Peter Schall[7], Ernst-Detlef Schulze[13], Juliane Vogt[1], Stephan Wöllauer[12] & Wolfgang W. Weisser[1]

Nature | Vol 574 | 31 October 2019 | **671**

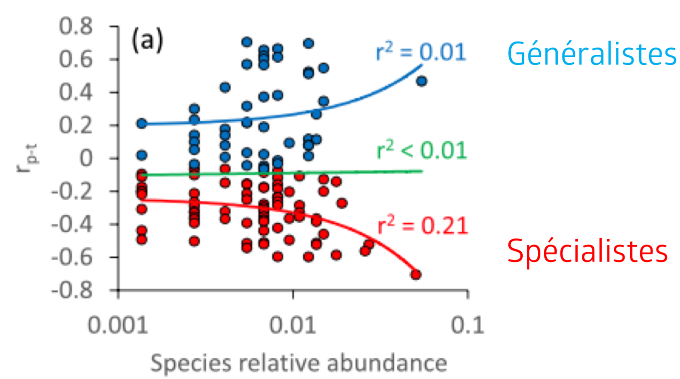
OPEN

Long-term large-scale decline in relative abundances of butterfly and burnet moth species across south-western Germany

Jan Christian Habel[1,2*], Robert Trusch[3], Thomas Schmitt[4,5], Michael Ochse[6] & Werner Ulrich[7]

SCIENTIFIC REPORTS | (2019) 9:14921

“Our data document a significant loss of relative abundance for most species, especially since the 1950s until today. Species demanding specific habitat requirements are more seriously suffering under this trend than generalists.“



COMMENT

https://doi.org/10.1038/s41467-018-07916-1 OPEN

Recognizing the quiet extinction of invertebrates

Nico Eisenhauer[1,2], Aletta Bonn[1,3,4] & Carlos A. Guerra[1,5]

NATURE COMMUNICATIONS | (2019)10:50

Invertebrates are central to the functioning of ecosystems, yet they are under-appreciated and understudied. Recent work has shown that they are suffering from rapid decline.

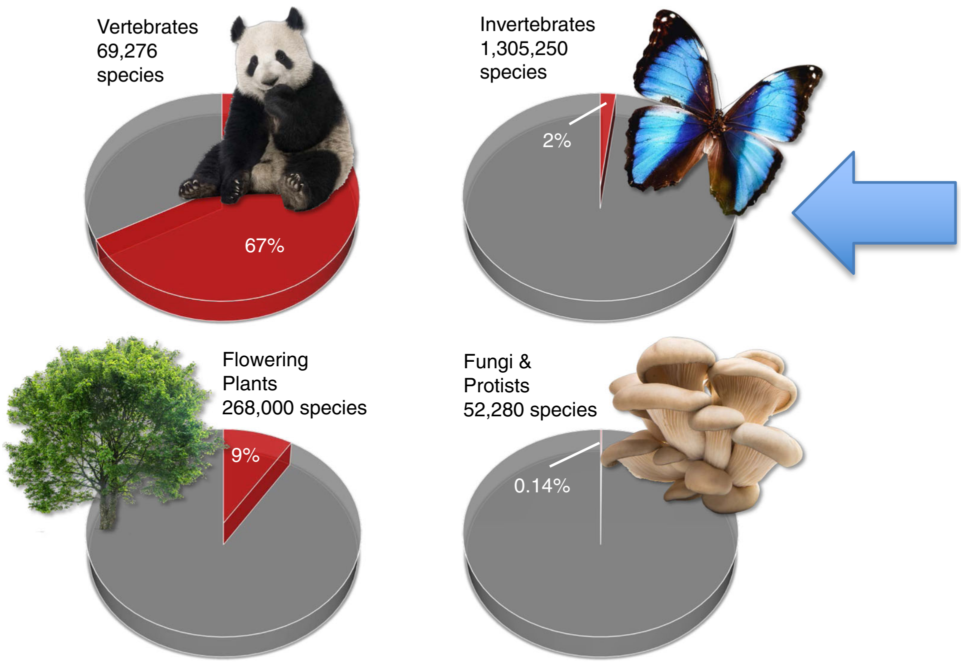


Fig. 1 Underrepresentation of invertebrates on IUCN Red List. Examples for percentages of species assessed on IUCN Red List by 2018 in comparison to the number of described species[7]. Notably, there is high variability in the percentage of evaluated species within these broad categories. For instance, only ~0.8% of all described insect species was evaluated in 2018. Photo credits: panda: Eric Isselée; butterfly: Fotokon; tree: Production Perig; fungi: ksena32 (all Fotolia.de)

La biodiversité s'effondre, épisode 28 : les insectes

BIODIVERSITY

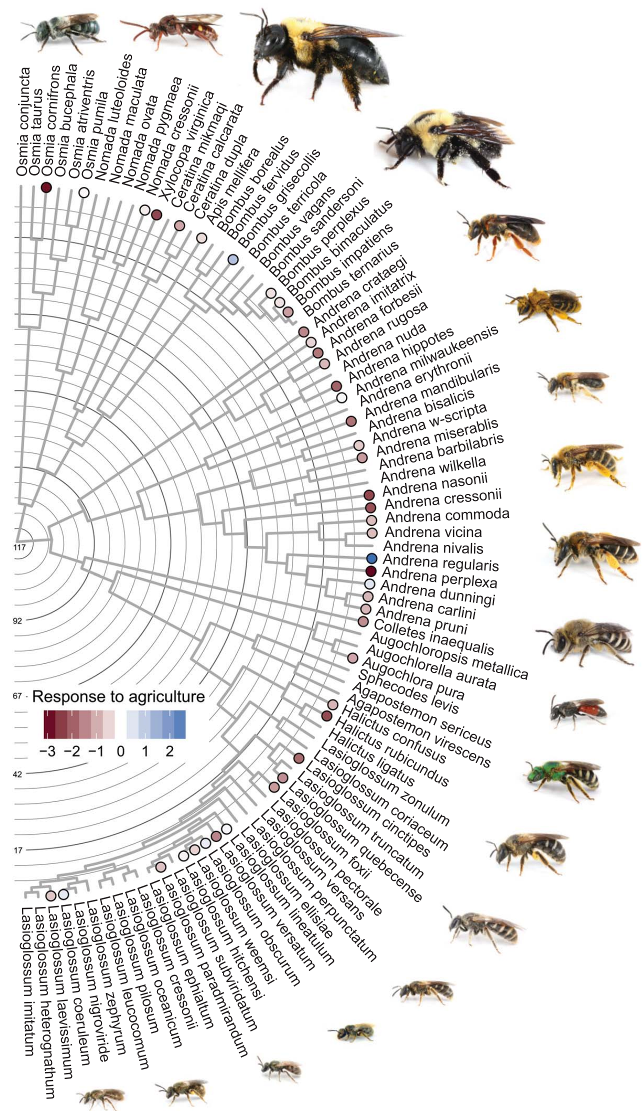
Agriculturally dominated landscapes reduce bee phylogenetic diversity and pollination services

Heather Grab[1*], Michael G. Branstetter[2], Nolan Amon[1,3], Katherine R. Urban-Mead[1], Mia G. Park[4], Jason Gibbs[5], Eleanor J. Blitzer[6], Katja Poveda[1], Greg Loeb[7], Bryan N. Danforth[1]

Grab *et al.*, *Science* **363**, 282–284 (2019)

Pollinator communities in highly agricultural landscapes contain 230 million fewer years of evolutionary history; this loss was strongly associated with reduced crop yield and quality.

Our study links landscape-mediated changes in the phylogenetic structure of natural communities to the disruption of ecosystem services. Measuring conservation success by species counts alone may fail to protect ecosystem functions and the full diversity of life from which they are derived.



Neonicotinoids in excretion product of phloem-feeding insects kill beneficial insects

Miguel Calvo-Agudo[a,b], Joel González-Cabrera[c], Yolanda Picó[d], Pau Calatayud-Vernich[d], Alberto Urbaneja[a], Marcel Dicke[b], and Alejandro Tena[a,1]

PNAS | **August 20, 2019** | vol. 116 | no. 34 | **16817–16822**

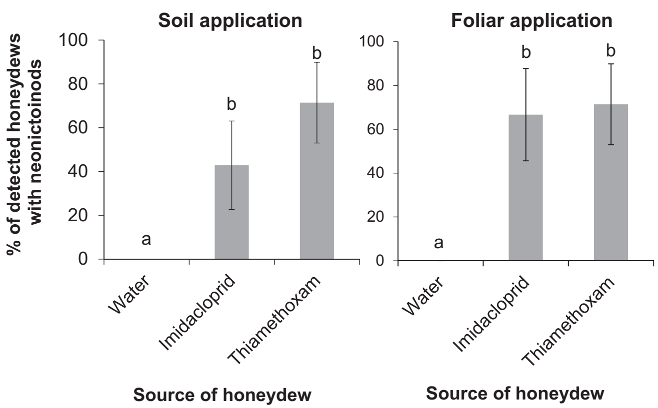


Fig. 3. Honeydew contaminated by neonicotinoid insecticides. Percentage (mean ± SE) of soil-treated trees (*Left*) or foliar-treated trees (*Right*) with *P. citri* honeydew contaminated by neonicotinoids. Neonicotinoids were detected using LC-MS/MS. Columns with different letters are significantly different from each other (Fisher´s exact test, $P < 0.05$; number of trees per treatment = 6 to 7).

Monarch butterfly and milkweed declines substantially predate the use of genetically modified crops

J. H. Boyle[a], H. J. Dalgleish[a], and J. R. Puzey[a,1]

3006–3011 | PNAS | **February 19, 2019** | vol. 116 | no. 8

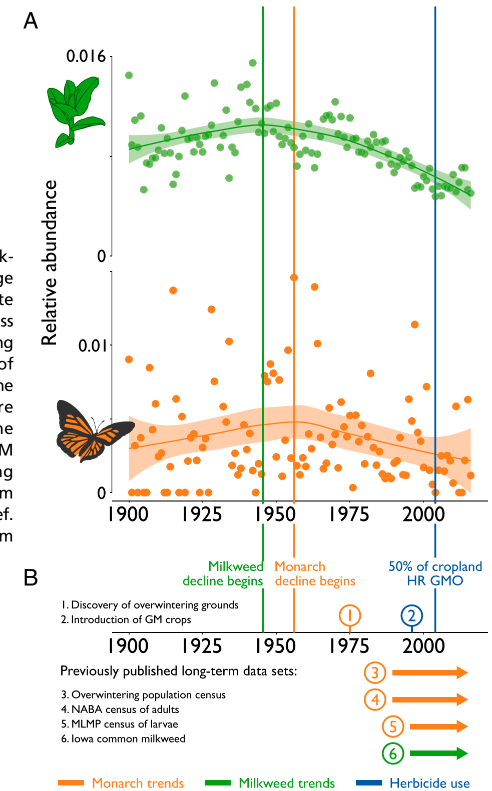


Fig. 1. Museum specimens reveal long-term trends in monarchs and milkweed. (*A*) Green points show annual abundance for milkweed spp.; orange points show annual abundance for monarchs; and lines and shading indicate smoothed mean and 95% confidence intervals, calculated using the Loess smoothing method implemented in ggplot2 (19), with the default smoothing span. Green and orange vertical lines indicate the approximate beginning of the decline for milkweed and monarchs, respectively. The blue vertical line indicates the point at which half of all corn, soybeans, and cotton are herbicide resistant (HR) GM varieties. (*B*) Indicates (1) the discovery of the monarch overwintering grounds in Mexico; (2) the introduction of GM crops; (3) the winter population census at the Mexican overwintering grounds (20); (4) the summer NABA census of adults (available from ref. 7); (5) the summer MLMP census of eggs and larvae (available from ref. 5); and (6) the summer census of Iowa *A. syriaca* abundance (available from ref. 5).

FRB
FONDATION POUR LA RECHERCHE SUR LA BIODIVERSITÉ

La biodiversité s’effondre, épisode 28 : les insectes

Essay

The insect apocalypse, and why it matters

Dave Goulson

The majority of conservation efforts and public attention are focused on large, charismatic mammals and birds such as tigers, pandas and penguins, yet the bulk of animal life, whether measured by biomass, numerical abundance or numbers of species, consists of invertebrates such as insects. Arguably, these innumerable little creatures are far more important for the functioning of ecosystems than their furry or feathered brethren, but until recently we had few long-term data on their population trends. Recent studies from Germany and Puerto Rico suggest that insects may be in a state of catastrophic population collapse: the German data describe a 76% decline in biomass over 26 years, while the Puerto Rican study estimates a decline of between 75% and 98% over 35 years. Corroborative evidence, for example from butterflies in Europe and California (which both show slightly less dramatic reductions in abundance), suggest that these declines are not isolated. The causes are much debated, but almost certainly include habitat loss, chronic exposure to pesticides, and climate change. The consequences are clear; insects are integral to every terrestrial food web, being food for numerous birds, bats, reptiles, amphibians and fish, and performing vital roles such as pollination, pest control and nutrient recycling. Terrestrial and freshwater ecosystems will collapse without insects. These studies are a warning that we may have failed to appreciate the full scale and pace of environmental degradation caused by human activities in the Anthropocene.

Current Biology 29, R942–R995, October 7, 2019 © 2019 I

CONSERVATION

Toward a world that values insects

Rapid adoption of conservation measures is key to protecting insect populations

By **Yves Basset**[1,2,3,4] *and*
Greg P. A. Lamarre[2,3,5]

Science 28 JUNE 2019 • VOL 364 ISSUE 6447

We need a bioliterate society that protects insects to ensure humanity’s own survival.

Termites mitigate the effects of drought in tropical rainforest

L. A. Ashton[1,2,3*], **H. M. Griffiths**[4*†], **C. L. Parr**[4,5,6], **T. A. Evans**[7], **R. K. Didham**[7,8], **F. Hasan**[2], **Y. A. Teh**[9], **H. S. Tin**[10], **C. S. Vairappan**[10], **P. Eggleton**[2]

Ashton *et al.*, *Science* **363**, 174–177 (2019)

La biodiversité s'effondre, épisode 28 : les insectes

La biodiversité s'effondre, épisode 29 : les oiseaux

Long-term declines of European insectivorous bird populations and potential causes

Diana E. Bowler[1,2,3]*, Henning Heldbjerg[4,5] Anthony D. Fox[5] Maaike de Jong,[6] and Katrin Böhning-Gaese[1,7]

Conservation Biology, Volume 33, No. 5, 1120–1130

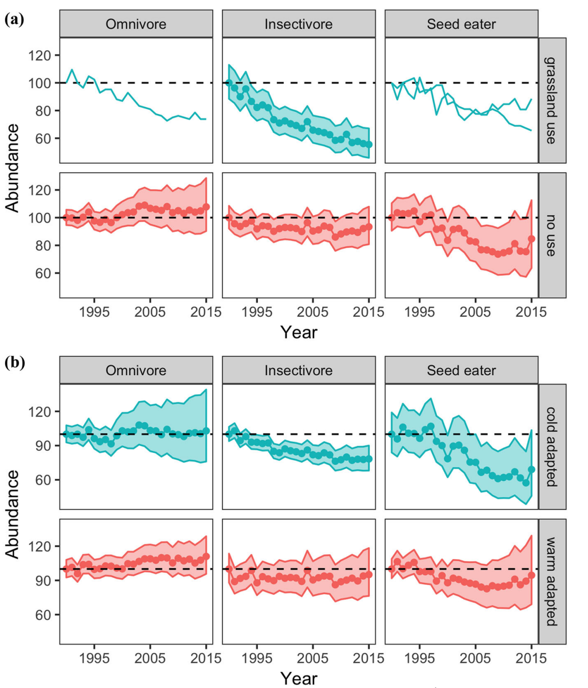


Figure 4. Mean (95% CI) annual abundance indices for European birds in 3 diet groups by (a) grassland use and (b) temperature preference. Because seedeaters and omnivores using grassland had fewer than 5 species in their groups, the individual time series for each species is shown.

BIODIVERSITY LOSS

Decline of the North American avifauna

Kenneth V. Rosenberg[1,2]*, Adriaan M. Dokter[1], Peter J. Blancher[3], John R. Sauer[4], Adam C. Smith[5], Paul A. Smith[3], Jessica C. Stanton[6], Arvind Panjabi[7], Laura Helft[1], Michael Parr[2], Peter P. Marra[8]†

Rosenberg *et al.*, *Science* **366**, 120–124 (2019)

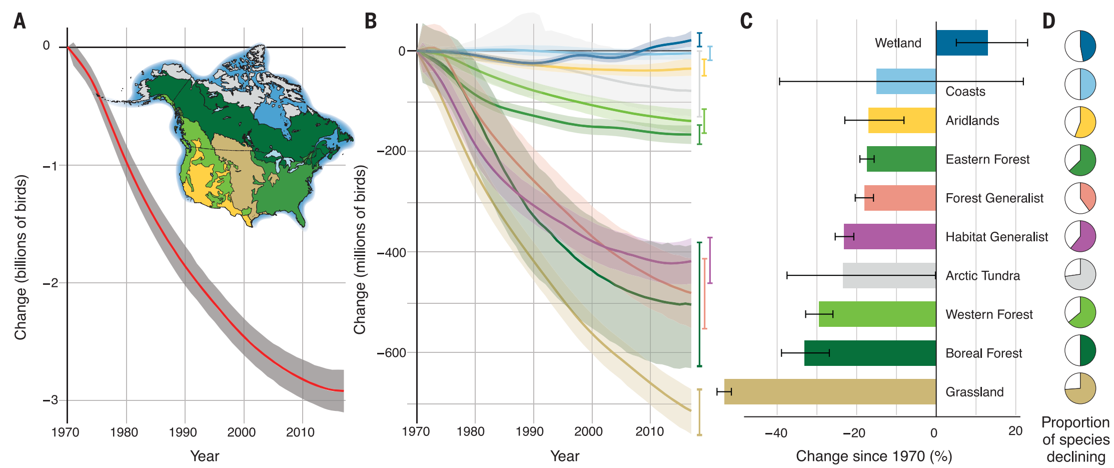


Fig. 1. Net population change in North American birds. (**A**) By integrating population size estimates and trajectories for 529 species (*18*), we show a net loss of 2.9 billion breeding birds across the continental avifauna since 1970. Gray shading represents the 95% credible interval (CI) around total estimated loss. Map shows color-coded breeding biomes based on Bird Conservation Regions and land cover classification (*18*). (**B**) Net loss of abundance occurred across all major breeding biomes except wetlands (see Table 1). (**C**) Proportional net population change relative to 1970, ±95% CI. (**D**) Proportion of species declining in each biome.

BIODIVERSITY LOSS

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Rosenberg *et al.*, *Science* **366**, 120–124 (2019)

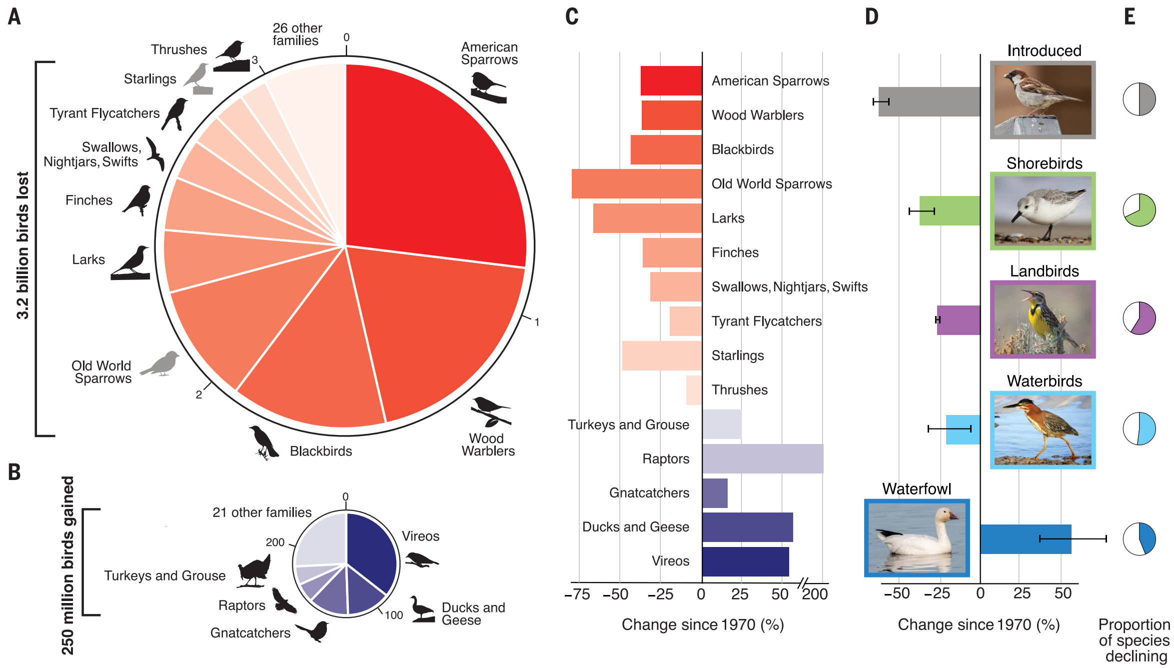


Fig. 3. Gains and losses across the North American avifauna over the past half-century. (**A**) Bird families were categorized as having a net loss (red) or gain (blue). Total loss of 3.2 billion birds occurred across 38 families; each family with losses greater than 50 million individuals is shown as a proportion of total loss, including two introduced families (gray). Swallows, nightjars, and swifts together show loss within the aerial insectivore guild. (**B**) Twenty-nine families show a total gain of 250 million individual birds; the five families with gains greater than 15 million individuals are shown as a proportion of total gain. Four families of raptors are shown as a single group. Note that combining total gain and total loss yields a net loss of 2.9 billion birds across the entire avifauna. (**C**) For each individually represented family in (B) and (C), proportional population change within that family is shown. See table S2 for statistics on each individual family. (**D**) Percentage population change among introduced and each of four management groups (*18*). A representative species from each group is shown (top to bottom, house sparrow, *Passer domesticus*; sanderling, *Calidris alba*; western meadowlark, *Sturnella neglecta*; green heron, *Butorides virescens*; and snow goose, *Anser caerulescens*). (**E**) Proportion of species with declining trends.

The decline of farmland birds in Spain is strongly associated to the loss of fallowland

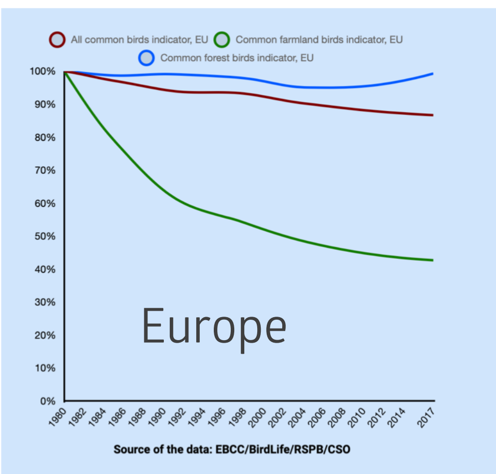
Juan Traba[1,2] & Manuel B. Morales[1,2]

SCIENTIFIC REPORTS | (2019) 9:9473

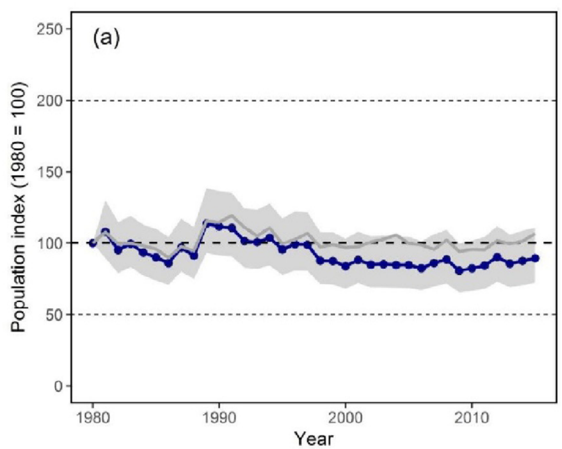
An analysis of trends, uncertainty and species selection shows contrasting trends of widespread forest and farmland birds in Europe

Richard D. Gregory[a,b,*], Jana Skorpilova[c], Petr Vorisek[c,d], Simon Butler[e]

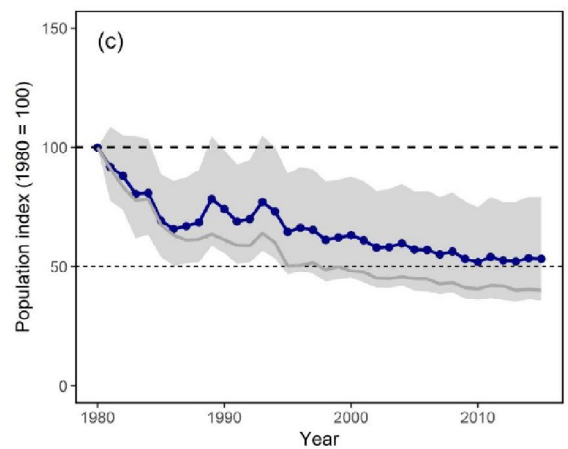
Ecological Indicators 103 (2019) 676–687



https://pecbms.info/european-wild-bird-indicators-2019-update/



Forest birds



Farmland birds

La biodiversité s'effondre, épisode 29 : les oiseaux

RESEARCH ARTICLE

Journal of Animal Ecology

Land-use change increases climatic vulnerability of migratory birds: Insights from integrated population modelling

Qing Zhao[1] | Todd W. Arnold[2] | James H. Devries[3] | David W. Howerter[3] | Robert G. Clark[4] | Mitch D. Weegman[1]

J Anim Ecol. 2019;88:1625–1637.

RESEARCH ARTICLE

Modeling effects of crop production, energy development and conservation-grassland loss on avian habitat

Jill A. Shaffer[1]*, Cali L. Roth[2], David M. Mushet[1]

PLOS ONE | https://doi.org/10.1371/journal.pone.0198382 January 9, 2019

NEONICOTINOID IMPACTS

A neonicotinoid insecticide reduces fueling and delays migration in songbirds

Margaret L. Eng[1], Bridget J. M. Stutchbury[2], Christy A. Morrissey[3,4]*

Eng *et al.*, *Science* **365**, 1177–1180 (2019)

Cooling requirements fueled the collapse of a desert bird community from climate change

Eric A. Riddell[a,1], Kelly J. Iknayan[a,b], Blair O. Wolf[c], Barry Sinervo[d], and Steven R. Beissinger[a,b]

PNAS | October 22, 2019 | vol. 116 | no. 43 | 21609–21615

ECOLOGY

Defaunation precipitates the extinction of evolutionarily distinct interactions in the Anthropocene

Carine Emer[1]*, Mauro Galetti[1], Marco A. Pizo[2], Pedro Jordano[3], Miguel Verdú[4]

Emer *et al.*, *Sci. Adv.* 2019; **5** : eaav6699 19 June 2019

MARINE ECOLOGY

Seabird clues to ecosystem health

Seabird monitoring provides essential information on the state of marine ecosystems

By **Enriqueta Velarde[1], Daniel W. Anderson[2], Exequiel Ezcurra[3]**

Science 12 JULY 2019 • VOL 365 ISSUE 6449

Receding ice drove parallel expansions in Southern Ocean penguins

Theresa L. Cole[a,b,1], Ludovic Dutoit[a,2], Nicolas Dussex[c,d,2], Tom Hart[e,2], Alana Alexander[d,2], Jane L. Younger[f], Gemma V. Clucas[g,h], María José Frugone[i,j], Yves Cherel[k], Richard Cuthbert[l,m], Ursula Ellenberg[n,o], Steven R. Fiddaman[p], Johanna Hiscock[q], David Houston[r], Pierre Jouventin[s], Thomas Mattern[a], Gary Miller[t,u], Colin Miskelly[v], Paul Nolan[w], Michael J. Polito[x], Petra Quillfeldt[y], Peter G. Ryan[z], Adrian Smith[p], Alan J. D. Tennyson[v], David Thompson[aa], Barbara Wienecke[bb], Juliana A. Vianna[cc], and Jonathan M. Waters[a]

26690–26696 | PNAS | December 26, 2019 | vol. 116 | no. 52

Together, these analyses highlight dramatic, ecosystem-wide responses to past Southern Ocean climate change and suggest potential for further shifts as warming continues.

Divergent trophic responses of sympatric penguin species to historic anthropogenic exploitation and recent climate change

Kelton W. McMahon[a,1], Chantel I. Michelson[b], Tom Hart[c], Matthew D. McCarthy[d], William P. Patterson[e], and Michael J. Polito[b,1,2]

PNAS | December 17, 2019 | vol. 116 | no. 51 | 25721–25727

The specialized foraging niche of chinstrap penguins likely renders them more sensitive to changes in krill availability, relative to gentoo penguins, as evinced by their declining population trends in the Antarctic Peninsula over the past 40 y. Over the next century, similarly divergent trophic and population responses are likely to occur among Antarctic krill predators if climate change and other anthropogenic impacts continue to favor generalist over specialist species.

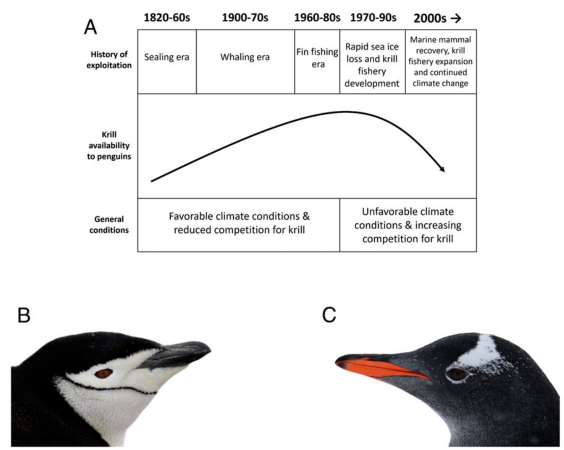


Fig. 1. Drivers of krill availability in the Antarctic Peninsula region. (*A*) A conceptual summary of the historic and recent ecosystem perturbations in the Antarctic Peninsula region and their hypothesized implication for the availability of Antarctic krill to penguins in the genus *Pygoscelis* including (*B*) chinstrap (*P. antarctica*) and (C) gentoo (*P. papua*) penguins. (*A*) Adapted with permission from ref. 20.

La biodiversité s'effondre, épisode 29 : les oiseaux









Evidence of region-wide bat population decline from long-term monitoring and Bayesian occupancy models with empirically informed priors

Thomas J. Rodhouse[1] | Rogelio M. Rodriguez[2] | Katharine M. Banner[3] | Patricia C. Ormsbee[4] | Jenny Barnett[5] | Kathryn M. Irvine[6]

Ecology and Evolution. 2019;9:11078–11088.

Multiscale model of regional population decline in little brown bats due to white-nose syndrome

Andrew M. Kramer[1] | Claire S. Teitelbaum[2] | Ashton Griffin[2] | John M. Drake[3]

Ecology and Evolution. 2019;9:8639–8651.

Cure for White-Nose Syndrome? | Christopher J. G...
christopherjgervais.wordpress.com

A smart curtailment approach for reducing bat fatalities and curtailment time at wind energy facilities

Mark A. Hayes[1,8] Lauren A. Hooton,[2] Karen L. Gilland,[1] Chuck Grandgent,[1] Robin L. Smith,[1] Stephen R. Lindsay,[1] Jason D. Collins,[3] Susan M. Schumacher,[4] Paul A. Rabie,[5] Jeffrey C. Gruver,[6] and John Goodrich-Mahoney[7]

Ecological Applications, 29(4), 2019, e01881

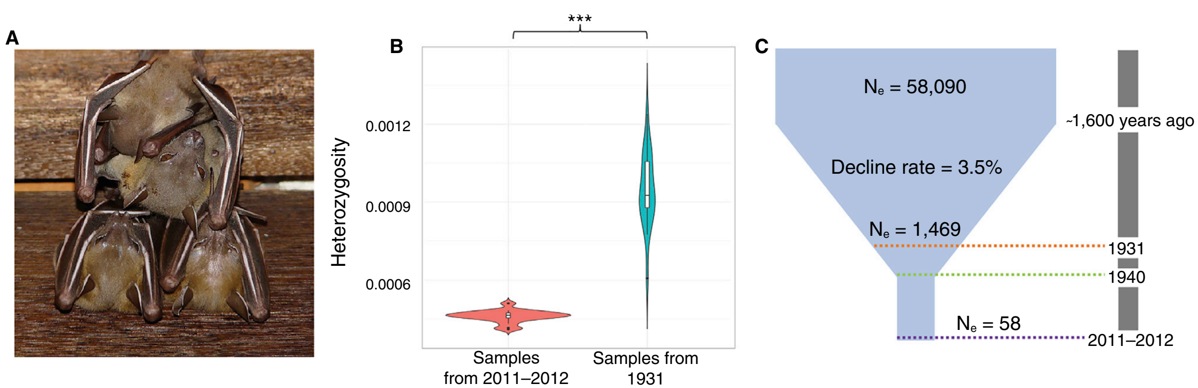


Figure 1. Decrease in genetic diversity and population size during the Anthropocene within a Singaporean population of *Cynopterus brachyotis*.

Correspondence

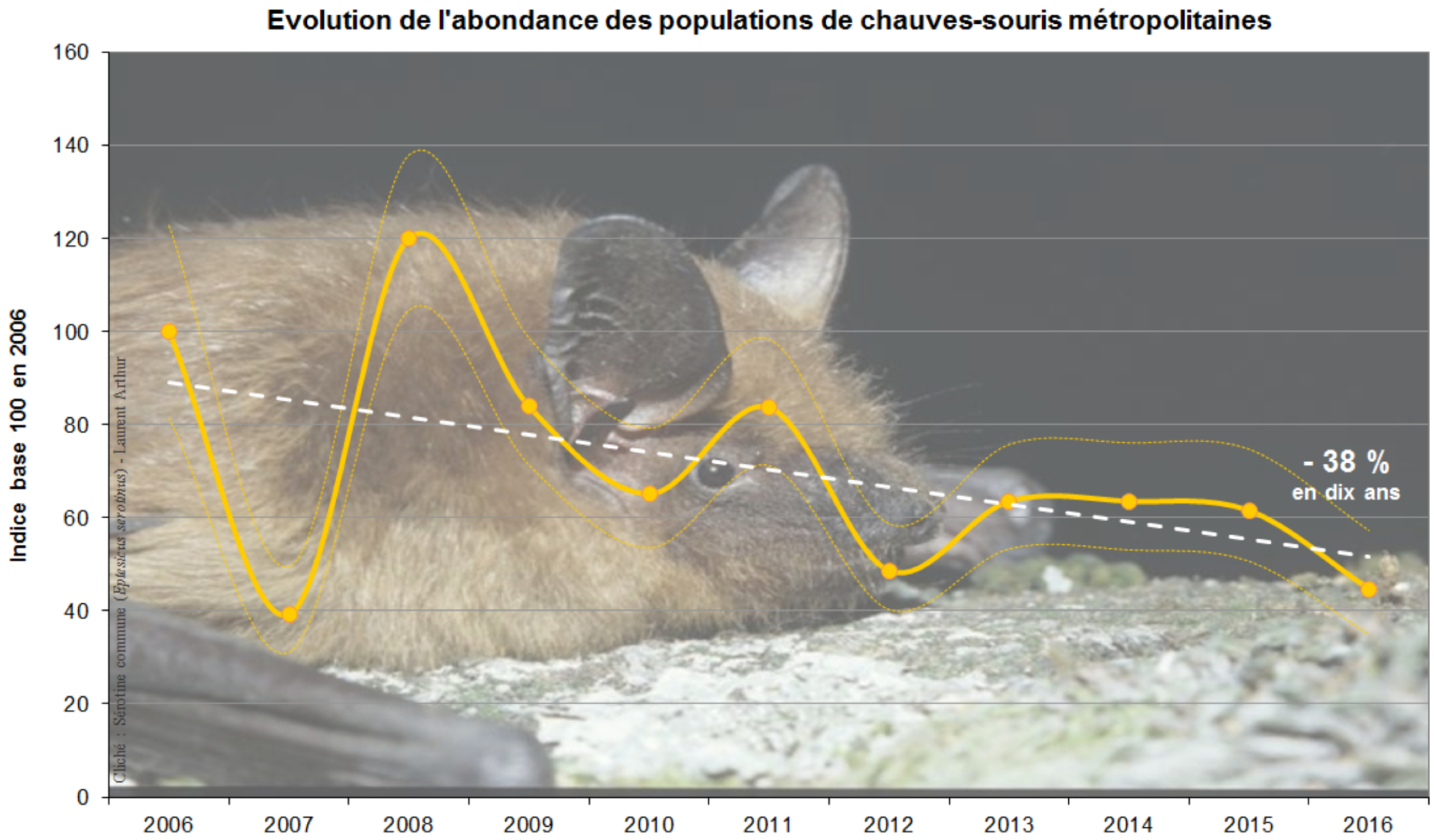
Historic DNA reveals Anthropocene threat to a tropical urban fruit bat

Balaji Chattopadhyay[1,*], Kritika M. Garg[1], Ian H. Mendenhall[2], and Frank E. Rheindt[1,3,*]

Current Biology *29*, R1269–R1300, December 16, 2019

La biodiversité s'effondre, épisode 30 : les vertébrés

Pour info : en France



Note : prise en compte de 7 espèces ou groupes d'espèces : groupe des *Myotis*, *P. kulhii*, *P. pipistrellus*, *P. pygmaeus*, *E. seronitus*, *N. leisleri* et *N. noctula*.

ONB Observatoire National

Visuel ONB, d'après :
Origine des données : Programme Vigie-chiro de Vigie Nature
Traitements : CESCO - UMS Patrinat, 2017

Populations de chauves-souris

La biodiversité s’effondre, épisode 30 : les vertébrés

ARTICLE

https://doi.org/10.1038/s42003-019-0640-y OPEN

Habitat degradation and indiscriminate hunting differentially impact faunal communities in the Southeast Asian tropical biodiversity hotspot

Andrew Tilker[1,2,10]*, Jesse F. Abrams[1,10]*, Azlan Mohamed[1,3], An Nguyen[1,2], Seth T. Wong[1], Rahel Sollmann[4], Jürgen Niedballa[1], Tejas Bhagwat[1], Thomas N.E. Gray[5], Benjamin M. Rawson[6], Francois Guegan[7], Johnny Kissing[8], Martin Wegmann[9] & Andreas Wilting[1]

COMMUNICATIONS BIOLOGY | (2019)2:396

Human-modified landscapes alter mammal resource and habitat use and trophic structure

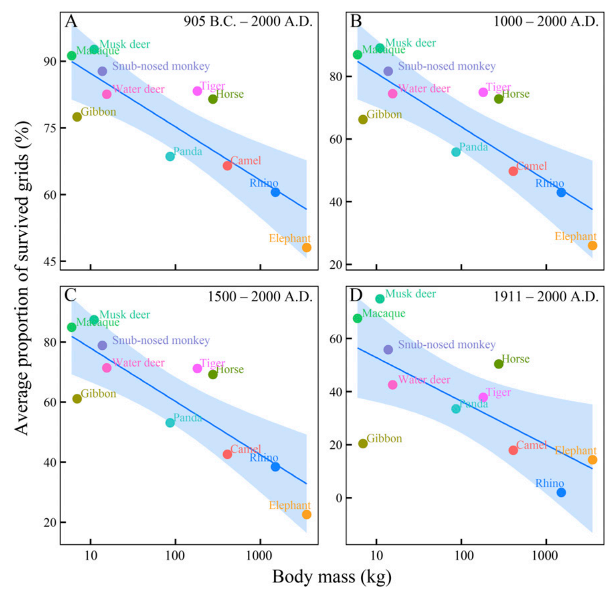
Marcelo Magioli[a,b,1], Marcelo Zacharias Moreira[c], Renata Cristina Batista Fonseca[d], Milton Cezar Ribeiro[e], Márcia Gonçalves Rodrigues[f], and Katia Maria Paschoaletto Micchi de Barros Ferraz[a]

18466–18472 | PNAS | September 10, 2019 | vol. 116 | no. 37

Historical records reveal the distinctive associations of human disturbance and extreme climate change with local extinction of mammals

Xinru Wan[a,b,1], Guangshun Jiang[c,1], Chuan Yan[a,b,1], Fangliang He[d,e], Rongsheng Wen[f], Jiayin Gu[c], Xinhai Li[a,b], Jianzhang Ma[c], Nils Chr. Stenseth[g], and Zhibin Zhang[a,b,2]

PNAS | September 17, 2019 | vol. 116 | no. 38 | 19001–19008



La biodiversité s'effondre, épisode 30 : les vertébrés

RESEARCH ARTICLE

Terrestrial mammal responses to oil palm dominated landscapes in Colombia

Lain E. Pardo[1,2]*, Mason J. Campbell[1], Will Edwards[1], Gopalasamy Reuben Clements[1,3,4], William F. Laurance[1]

PLOS ONE | https://doi.org/10.1371/journal.pone.0197539

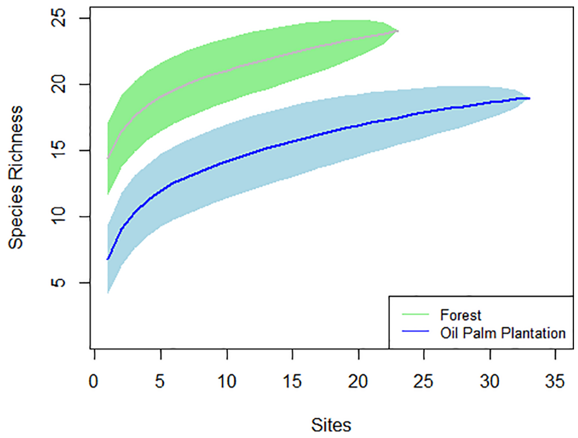


Fig 2. Sample-based rarefaction curves estimating medium and large terrestrial mammal species richness in Llanos, Colombia.

Risk of biodiversity collapse under climate change in the Afro-Arabian region

Alaaeldin Soultan[1,2], Martin Wikelski[1,2] & Kamran Safi[1,2]

SCIENTIFIC REPORTS | (2019) 9:955

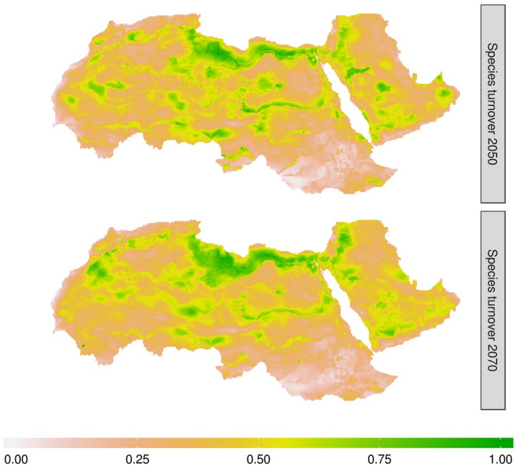


Figure 3. Temporal species turnover of the endemic mammal species in the Afro-Arabian region. The zero value indicates no change in species composition over time (2050 and 2070) and the value of one indicates a complete change in species composition.

Long-term effects of cultural filtering on megafauna species distributions across China

Shuqing N. Teng[a,b,c,1], Chi Xu (徐驰)[a,1], Licheng Teng[d], and Jens-Christian Svenning[b,c,1]

486–493 | PNAS | January 7, 2020 | vol. 117 | no. 1

This finding suggests that the millennia-long spread of agricultural land and agricultural intensification, often accompanied by expansion of the Han culture, has been responsible for the extirpation of these megafauna species (Asiatic elephant, rhinoceroses, tiger, Asiatic black bear, and brown bear) from much of China.

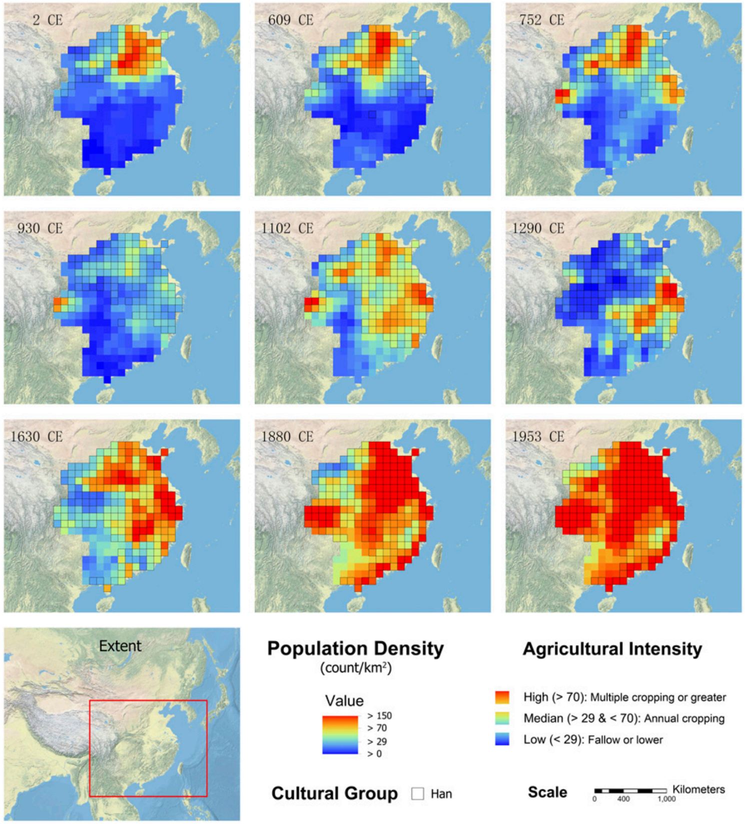
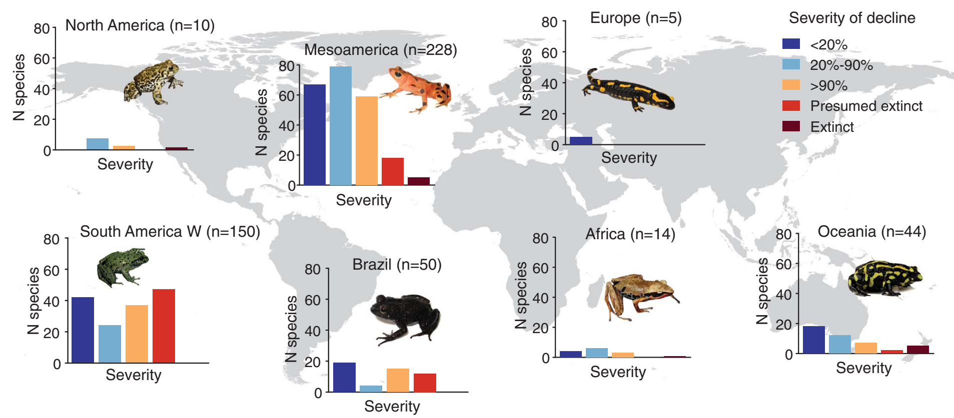


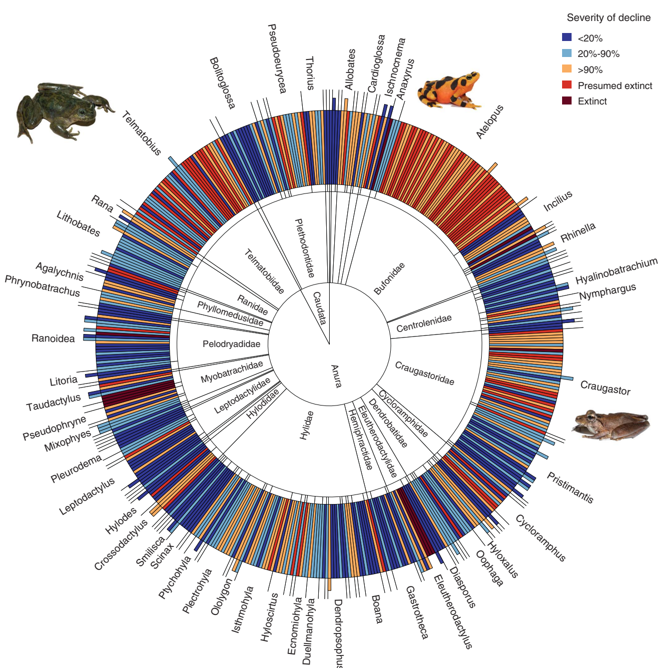
Fig. 2. Spatial patterns of human population density, agricultural intensity, and the Han culture in eastern China over the past 2 millennia. These three variables represent factors that may drive cultural filtering (*Methods*) via pathways of individual behavior, within-, and between-society evolution, respectively. Population density 29 and 70 are used as threshold values to classify the color ramp into three levels of agricultural intensity (see *SI Appendix, Supplementary text* for details).

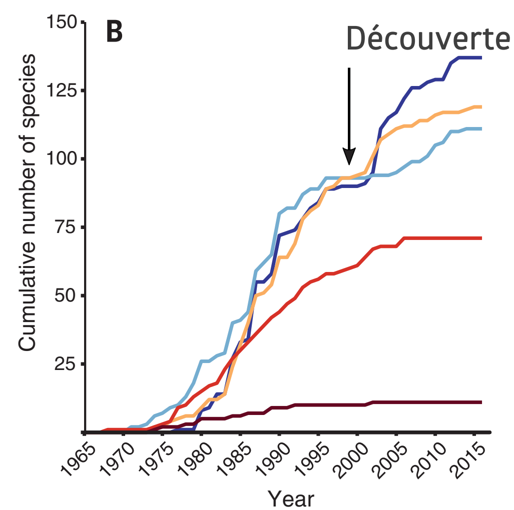
Amphibian fungal panzootic causes catastrophic and ongoing loss of biodiversity

Ben C. Scheele[1,2,3*], Frank Pasmans[4], Lee F. Skerratt[3], Lee Berger[3], An Martel[4], Wouter Beukema[4], Aldemar A. Acevedo[5,6], Patricia A. Burrowes[7], Tamilie Carvalho[8], Alessandro Catenazzi[9], Ignacio De la Riva[10], Matthew C. Fisher[11], Sandra V. Flechas[12,13], Claire N. Foster[1], Patricia Frías-Álvarez[3], Trenton W. J. Garner[14,15], Brian Gratwicke[16], Juan M. Guayasamin[17,18,19], Mareike Hirschfeld[20], Jonathan E. Kolby[3,21,22], Tiffany A. Kosch[3,23], Enrique La Marca[24], David B. Lindenmayer[1,2], Karen R. Lips[25], Ana V. Longo[26], Raúl Maneyro[27], Cait A. McDonald[28], Joseph Mendelson III[29,30], Pablo Palacios-Rodriguez[12], Gabriela Parra-Olea[31], Corinne L. Richards-Zawacki[32], Mark-Oliver Rödel[20], Sean M. Rovito[33], Claudio Soto-Azat[34], Luís Felipe Toledo[8], Jamie Voyles[35], Ché Weldon[15], Steven M. Whitfield[36,37], Mark Wilkinson[38], Kelly R. Zamudio[28], Stefano Canessa[4]

Scheele *et al.*, *Science* **363**, 1459–1463 (2019)







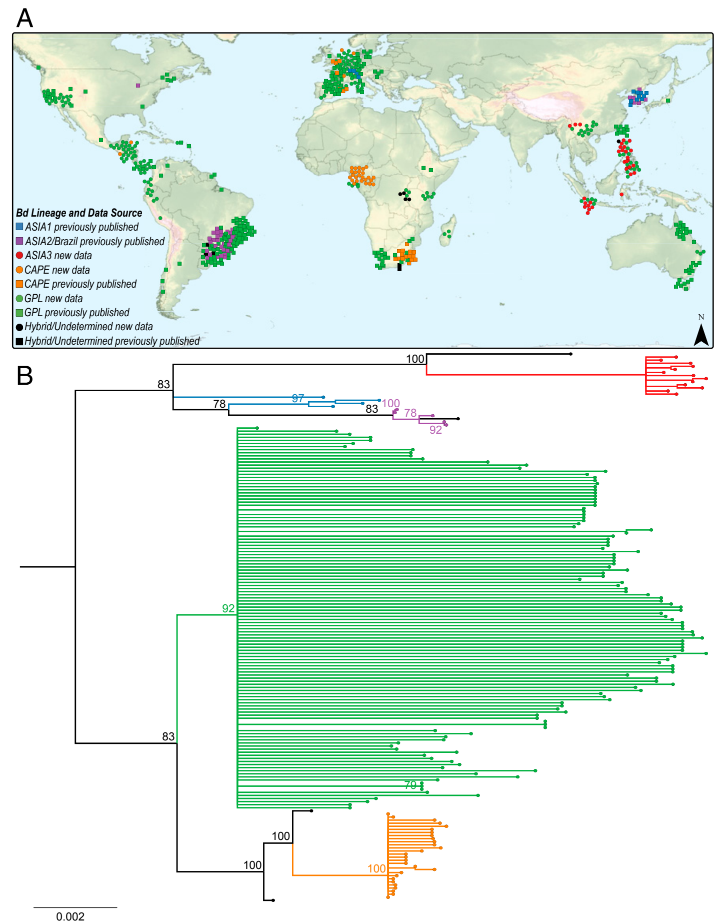
La biodiversité s'effondre, épisode 30 : les vertébrés

Cryptic diversity of a widespread global pathogen reveals expanded threats to amphibian conservation

Allison Q. Byrne[a,b], Vance T. Vredenburg[c], An Martel[d], Frank Pasmans[d], Rayna C. Bell[e,f], David C. Blackburn[g], Molly C. Bletz[h], Jaime Bosch[i,j], Cheryl J. Briggs[k], Rafe M. Brown[l,m], Alessandro Catenazzi[n], Mariel Familiar López[o], Raul Figueroa-Valenzuela[c], Sonia L. Ghose[p], Jef R. Jaeger[q], Andrea J. Jani[r], Miloslav Jirku[s], Roland A. Knapp[t], Antonio Muñoz[u], Daniel M. Portik[v], Corinne L. Richards-Zawacki[w], Heidi Rockney[x], Sean M. Rovito[y], Tariq Stark[z], Hasan Sulaeman[c], Nguyen Thien Tao[aa], Jamie Voyles[bb], Anthony W. Waddle[q,cc], Zhiyong Yuan[dd], and Erica Bree Rosenblum[a,b,1]

20382–20387 | PNAS | October 8, 2019 | vol. 116 | no. 41

Batrachochytrium dendrobatidis [Bd] is one of the most devastating wildlife pathogens ever documented. Most surveys for Bd report only the presence/absence of the pathogen. However, Bd has distinct genetic lineages that vary in geographic extent and virulence, thus reporting Bd presence alone is not particularly informative.



La biodiversité s'effondre, épisode 30 : les vertébrés

Global habitat loss and extinction risk of terrestrial vertebrates under future land-use-change scenarios

Ryan P. Powers and Walter Jetz *

NATURE CLIMATE CHANGE | VOL 9 | APRIL 2019 | 323–329 |

Substantial declines in suitable habitat are identified for species worldwide, with approximately 1,700 species expected to become imperilled due to land-use change alone. National stewardship for species highlights certain South American, Southeast Asian and African countries that are in particular need of proactive conservation planning.

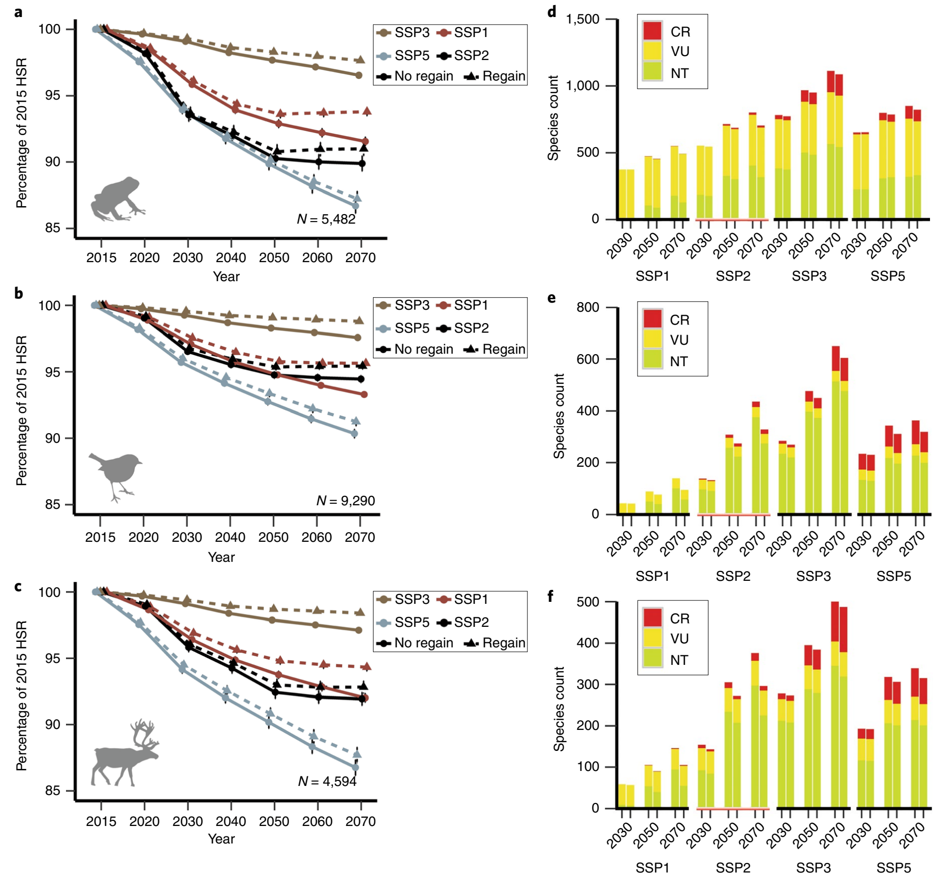


Fig. 2 | Projected trends in HSR and threat status up-listing based on harmonized land-use change projected under four different SSPs. a–c, The average (+/− 95% CI) projected HSR per SSP as a percentage of 2015. **d–f**, Counts of potentially up-listed species. The three paired bars in each SSP denote counts of elevated threat status for the 2015–2030, 2015–2050 and 2015–2070 epochs, respectively, and each pair addresses no regain (left bar) and regain assumption (right bar). We highlight SSP2, which is also used in Figs. 1, 3 and 4. In SSP2 we consider species currently designated as LC or DD with projected HSR of <20,000 km² and >10% loss of 2015 HSR as becoming NT, and species with projected HSR of <20 km² as VU. Species currently listed as VU or EN with projected >50% loss of 2015 HSR receive a future designation of CR. For other details, see Fig. 1.

La biodiversité s'effondre, épisode 30 : les vertébrés

Cascading impacts of large-carnivore extirpation in an African ecosystem

Justine L. Atkins[1*], Ryan A. Long[2], Johan Pansu[1,3,4], Joshua H. Daskin[1†], Arjun B. Potter[1], Marc E. Stalmans[5], Corina E. Tarnita[1], Robert M. Pringle[1*]

Atkins *et al.*, *Science* **364**, 173–177 (2019)

Whereas anthropogenic predator extinction disrupted a trophic cascade by enabling rapid differentiation of prey behavior, carnivore restoration may just as rapidly reestablish that cascade.

RESEARCH ARTICLE

Hotspots of human impact on threatened terrestrial vertebrates

James R. Allan[1,2*], James E. M. Watson[1,2,3], Moreno Di Marco[1,4], Christopher J. O'Bryan[1,2], Hugh P. Possingham[2,5], Scott C. Atkinson[2,6], Oscar Venter[7]

PLOS Biology | https://doi.org/10.1371/journal.pbio.3000158 March 12, 2019

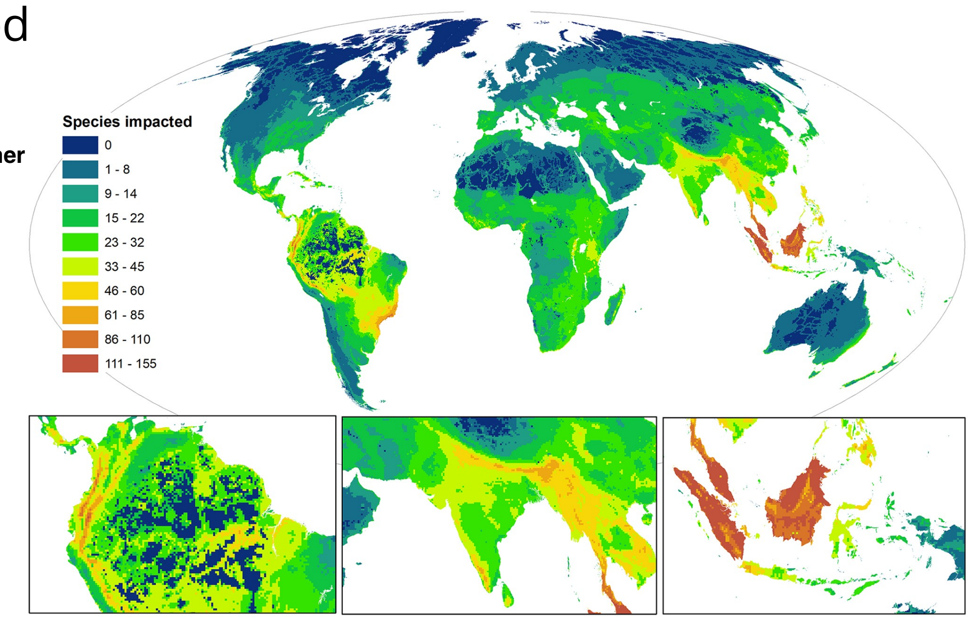


Fig 3. Cumulative human impacts on threatened and near-threatened terrestrial vertebrates (n = 5,457). Legend indicates the number of species in a grid cell impacted by at least one threat. Maps use a 30 km × 30 km grid and a Mollweide equal area projection. The data underlying this figure are freely available [31] (doi:10.1594/PANGAEA.897391).

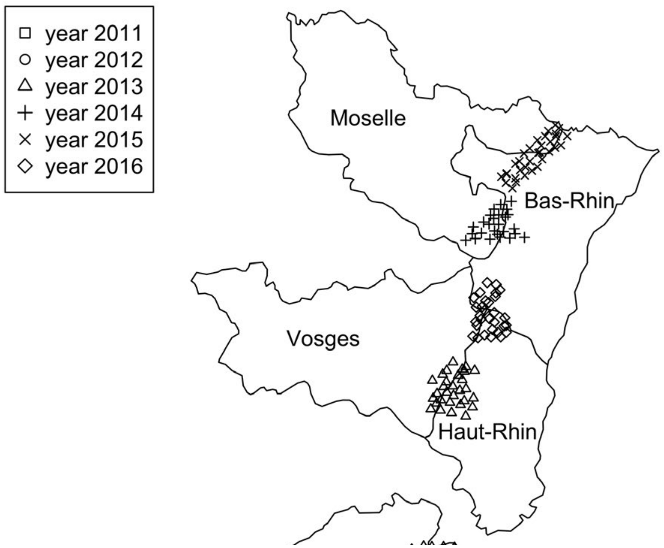
La biodiversité s'effondre, épisode 30 : les vertébrés

Spatial density estimates of Eurasian lynx (*Lynx lynx*) in the French Jura and Vosges Mountains

Olivier Gimenez[1] | **Sylvain Gatti**[2] | **Christophe Duchamp**[3] | **Estelle Germain**[4] | **Alain Laurent**[2] | **Fridolin Zimmermann**[5] | **Eric Marboutin**[2]

Ecology and Evolution. 2019;9:11707–11715.

While the estimated densities in the French Jura mountains are comparable to other lynx populations in Europe, the fact that we detected no lynx in the Vosges mountains is alarming. Connectivity should be encouraged between the French Jura mountains, the Vosges mountains, and the Palatinate Forest in Germany where a reintroduction program is currently ongoing. Our density estimates will help in setting a baseline conservation status for the lynx population in France.



Localisation des pièges photographiques

Le lynx dans les Vosges :

- 21 individus relâchés
- 10 individus fondateurs
- Une acceptation difficile
- Une forte pression de braconnage
- Un plan régional d'action ambitieux
- Une espèce éligible aux PNA…

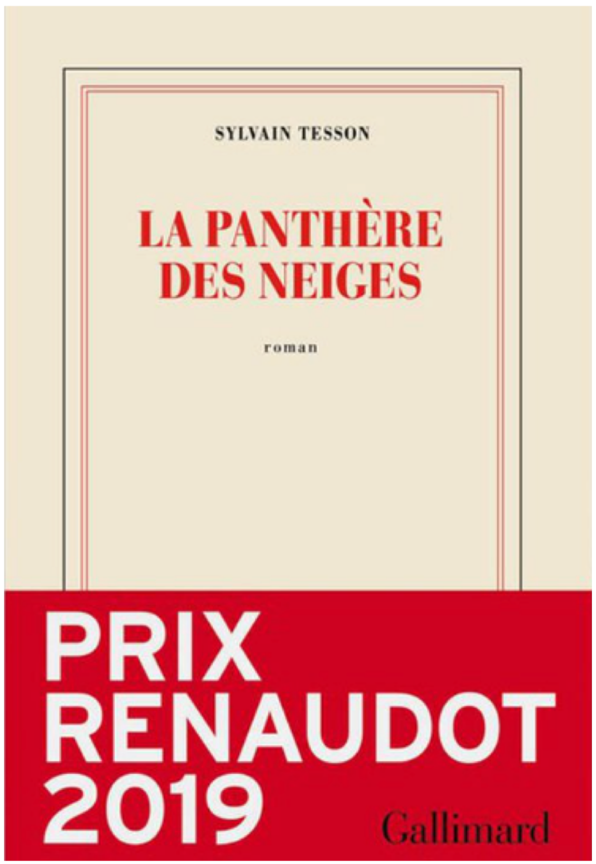
Bilan = Il resterait 3 mâles venus d'ailleurs…

E. Germain, comm. Pers.

www.programme-lynx-massif-des-vosges.org

La biodiversité s'effondre, épisode 30 : les vertébrés

Et dans le même temps, le superbe livre de Sylvain Tesson, Prix Renaudot 2019, s'est vendu à plus de 220 000 exemplaires



Chercher l'erreur ?

Altitude news

Désintérêt et extirpation d'un côté
Passion et empathie de l'autre

Mais la panthère des neiges est loin, très loin, et ne gène personne ici

La biodiversité s’effondre, épisode 30 : les vertébrés

WILDLIFE TRADE

Global wildlife trade across the tree of life

Brett R. Scheffers[1]*†, Brunno F. Oliveira[1,2]*, Ieuan Lamb[3], David P. Edwards[3]†

Scheffers *et al.*, *Science* **366**, 71–76 (2019)

Wildlife trade is a multibillion dollar industry that is driving species toward extinction. Of >31,500 terrestrial bird, mammal, amphibian, and squamate reptile species, ~18% (N = 5579) are traded globally. Trade is strongly phylogenetically conserved, and the hotspots of this trade are concentrated in the biologically diverse tropics.

Using different assessment approaches, we predict that, owing to their phylogenetic replacement and trait similarity to currently traded species, , future trade will affect up to 3196 additional species—totaling 8775 species at risk of extinction from trade.

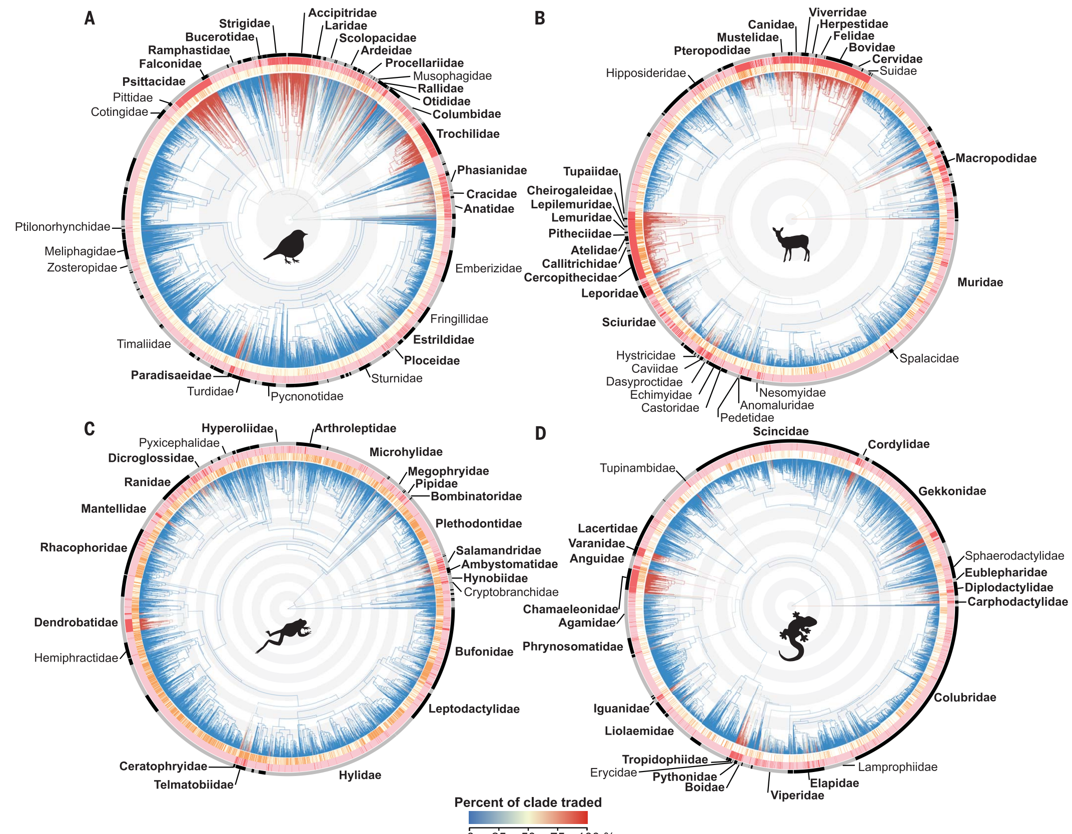
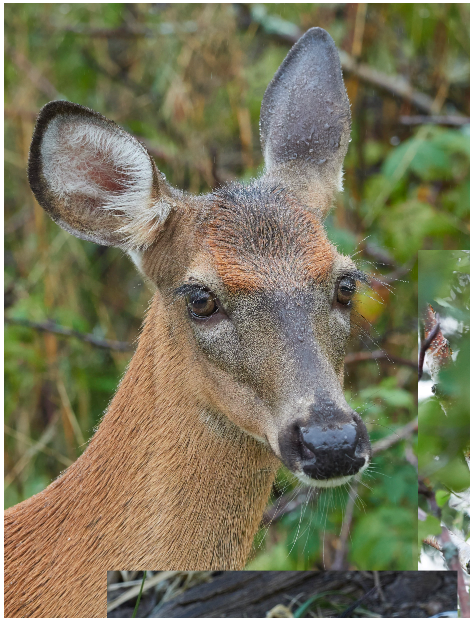
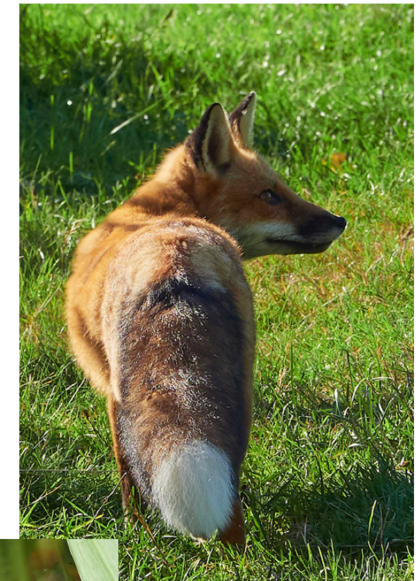
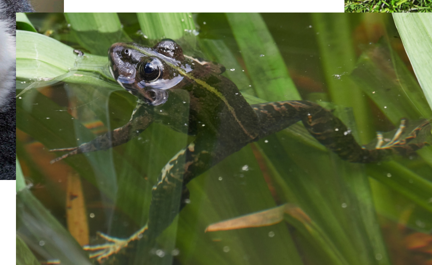


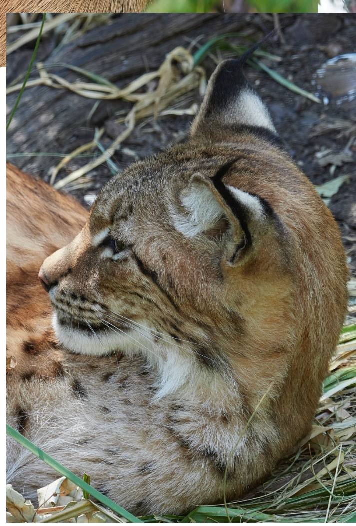
Fig. 2. Wildlife trade occurs across the tree of life, but some clades are more heavily targeted than others. Phylogeny branches for (**A**) birds, (**B**) mammals, (**C**) amphibians, and (**D**) reptiles are colored to represent the impact of wildlife trade up to each node (i.e., clade). Warmer colors (red) represent heavily traded branches (i.e., high percent of traded species). The 20 highest traded families are labeled (bold name indicates high richness, nonbold name indicates both high richness and proportion of total). The first outer band indicates threatened (VU, EN, CR, and DD; orange) and non-threatened (LC and NT; yellow) species. DD species were considered threatened because of their small geographic range size. The second outer band indicates traded (red) and nontraded (pink) species. Gray concentric circles scale a 20-million-year period.

La biodiversité s'effondre, épisode 30 : les vertébrés









La biodiversité s’effondre, épisode 31 : les plantes

APPLIED ECOLOGY

A third of the tropical African flora is potentially threatened with extinction

T. Stévart[1,2,3]*, G. Dauby[4,5,6]*, P. P. Lowry II[1], A. Blach-Overgaard[7,8], V. Droissart[4], D. J. Harris[9], B. A. Mackinder[9,10], G. E. Schatz[1], B. Sonké[11], M. S. M. Sosef[3], J.-C. Svenning[7,8], J. J. Wieringa[12], T. L. P. Couvreur[13]*†

Stévart *et al.*, *Sci. Adv.* 2019; **5**

Thirty-three percent of the species are potentially threatened with extinction, and another third of species are likely rare, potentially becoming threatened in the near future.
Four regions are highlighted with a high proportion (>40%) of potentially threatened species: Ethiopia, West Africa, central Tanzania, and southern Democratic Republic of the Congo.

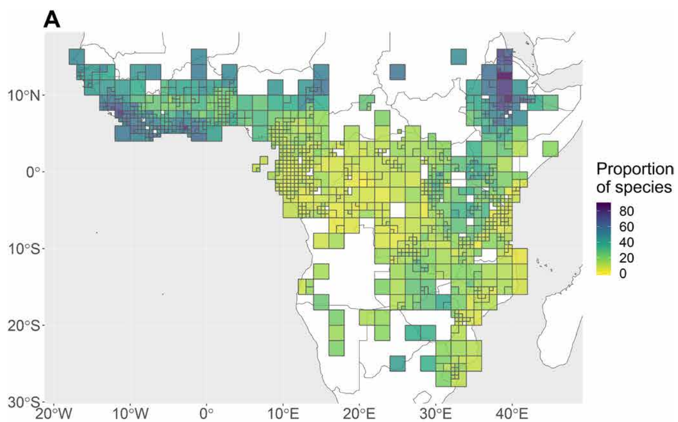


Fig. 2. Spatial distribution of threatened plant species across tropical Africa.

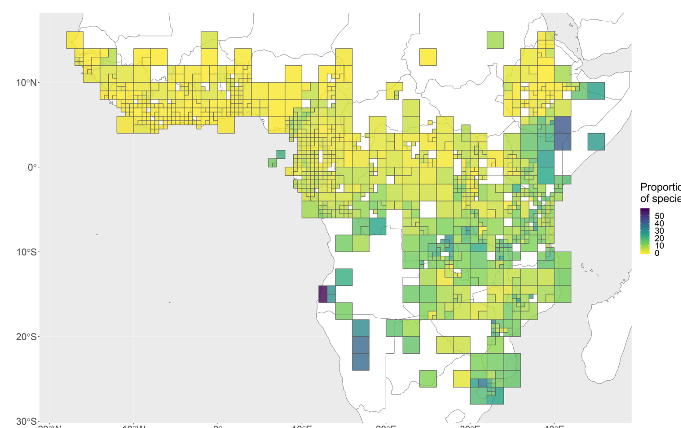


Fig. 3. Spatial distribution of rare plant species across tropical Africa.

La biodiversité s’effondre, épisode 31 : les plantes

ECOLOGY

The commonness of rarity: Global and future distribution of rarity across land plants

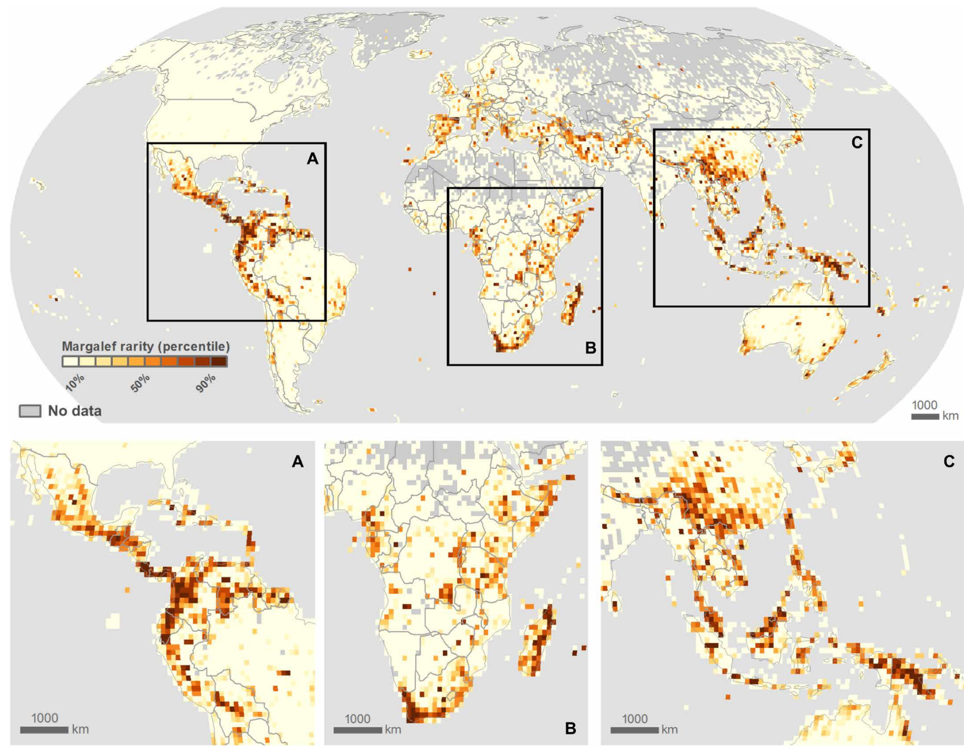
Brian J. Enquist[1,2]*, Xiao Feng[3], Brad Boyle[1], Brian Maitner[1], Erica A. Newman[1,3], Peter Møller Jørgensen[4], Patrick R. Roehrdanz[5], Barbara M. Thiers[6], Joseph R. Burger[3], Richard T. Corlett[7], Thomas L. P. Couvreur[8], Gilles Dauby[9], John C. Donoghue[10], Wendy Foden[11], Jon C. Lovett[12,13], Pablo A. Marquet[2,14,15], Cory Merow[16], Guy Midgley[17], Naia Morueta-Holme[18], Danilo M. Neves[19], Ary T. Oliveira-Filho[19], Nathan J. B. Kraft[20], Daniel S. Park[21], Robert K. Peet[22], Michiel Pillet[1], Josep M. Serra-Diaz[23], Brody Sandel[24], Mark Schildhauer[25], Irena Šímová[26,27], Cyrille Violle[28], Jan J. Wieringa[29], Susan K. Wiser[30], Lee Hannah[5], Jens-Christian Svenning[31], Brian J. McGill[32]

Enquist *et al.*, *Sci. Adv.* 2019; **5**

A large fraction, ~36.5% of Earth’s ~435,000 plant species, are exceedingly rare. Our results indicate that

(i) climatically more stable regions have harbored rare species and hence a large fraction of Earth’s plant species via reduced extinction risk but that

(ii) climate change and human land use are now disproportionately impacting rare species.



Where are rare species distributed geographically?

La biodiversité s’effondre, épisode 31 : les plantes

ECOLOGY

Mutualistic interactions reshuffle the effects of climate change on plants across the tree of life

Jordi Bascompte[1*†], María B. García[2†], Raúl Ortega[1], Enrico L. Rezende[3‡], Samuel Pironon[2§]

Bascompte *et al., Sci. Adv.* 2019;**5**

Climatically induced local species extinctions may trigger coextinction cascades, thus driving many more species to extinction than originally predicted by species distribution models. While geographic location best predicts the probability of a plant species to be driven to extinction by climate change, subsequent coextinctions are best predicted by the local network of interactions.

These coextinctions not only increase the total number of plant species being driven to extinction but also add a bias in the way the major taxonomic and functional groups are pruned.

Climate drives loss of phylogenetic diversity in a grassland community

Daijiang Li[a,1], Jesse E. D. Miller[b], and Susan Harrison[c,1]

PNAS | **October 1, 2019** | vol. 116 | no. 40 | **19989–19994**

Global dataset shows geography and life form predict modern plant extinction and rediscovery

Aelys M. Humphreys[1,2*], Rafaël Govaerts[3*], Sarah Z. Ficinski[1], Eimear Nic Lughadha[4] and Maria S. Vorontsova[1]

NATURE ECOLOGY & EVOLUTION | VOL 3 | JULY 2019 | 1043–1047 |

Table 1 | Rates of modern extinction in seed plants compared to vertebrates

	Total number of seed plant species described	Number of seed plant species extinct	Average seed plant taxonomic age (years)[a]	Seed plant extinction rate (E/MSY)[a]	Amphibian extinction rate (E/MSY)[b]	Bird extinction rate (E/MSY)[b]	Mammal extinction rate (E/MSY)[b]
Before 1900	129,529	256	171 (195)	11.6 (10.1)	66	49 (73[c])	72
1900–2018	204,793	315	60 (84)	25.6 (18.3)	107	132	243

Extinction rate is expressed as E/MSY. [a]Estimates without and, in brackets, with correction for the lag time between collection and description as a new species (24 years on average[18]). [b]Estimates from ref. [14]. [c]Estimate from ref. [13].

ECOLOGY

Climate change effects on plant-soil feedbacks and consequences for biodiversity and functioning of terrestrial ecosystems

Francisco I. Pugnaire[1,2]*, José A. Morillo[1,2], Josep Peñuelas[3,4], Peter B. Reich[5,6], Richard D. Bardgett[7], Aurora Gaxiola[2,8,9], David A. Wardle[10], Wim H. van der Putten[11,12]

Pugnaire *et al.*, *Sci. Adv.* 2019; **5** : eaaz1834   27 November 2019

Climate change influences PSFs through the performance of interacting species and altered community composition resulting from changes in species distributions. Climate change thus affects plant inputs into the soil subsystem via litter and rhizodeposits and alters the composition of the living plant roots with which mutualistic symbionts, decomposers, and their natural enemies interact.

Many of these plant-soil interactions are species-specific and are greatly affected by temperature, moisture, and other climate-related factors.

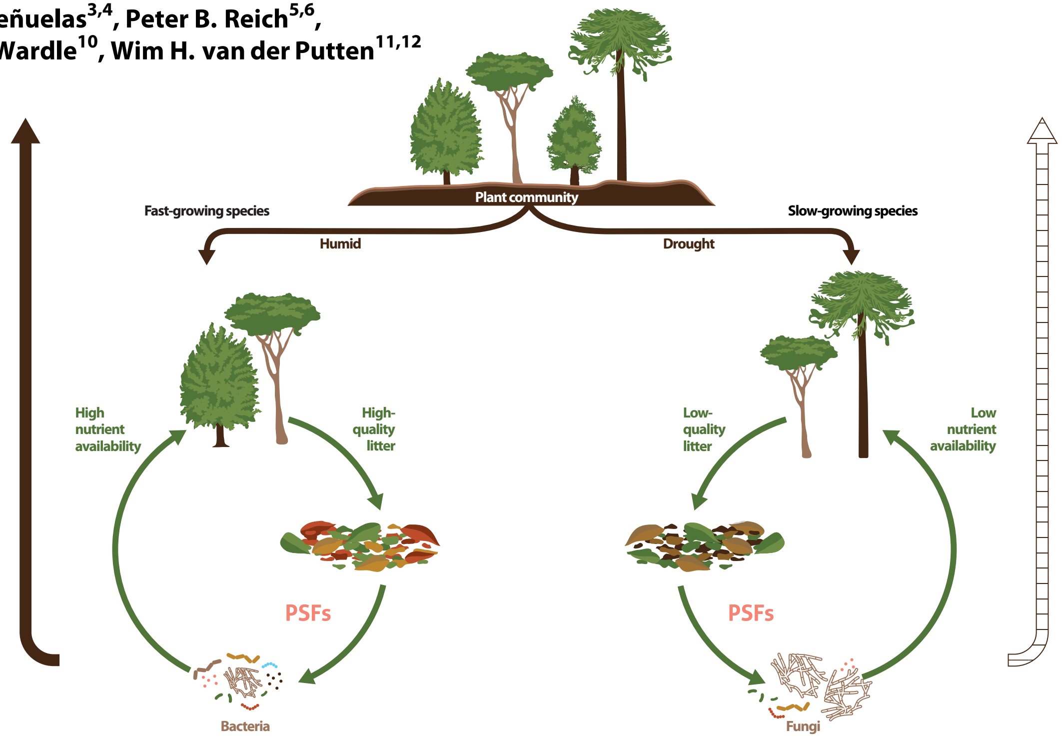


Fig. 2. Effects of drought on litter productivity and species turnover and their relationships with PSFs. Drought leads to low-quality litter with recalcitrant carbon (C) compounds and low nutrient content. This litter is difficult to decompose and determines a fungal-dominated microbial community composition while decreasing the availability of nutrients for plants. These conditions lead to a replacement by plant species that are better adapted to drought conditions, in contrast to more humid conditions where nutrient-rich litter is fast decomposed by bacterial-dominated microbial communities. Arrows indicate carbon flow; solid arrows represent net input, and dashed arrows represent net output, with arrow thickness proportional to flow.

FRB
FONDATION POUR LA RECHERCHE SUR LA BIODIVERSITÉ

La biodiversité s’effondre, épisode 31 : les plantes

Global change effects on plant communities are magnified by time and the number of global change factors imposed

Kimberly J. Komatsu[a,1,2], Meghan L. Avolio[b,2], Nathan P. Lemoine[c,3], Forest Isbell[d,3], Emily Grman[e,3], Gregory R. Houseman[f,3], Sally E. Koerner[g,3], David S. Johnson[h,3], Kevin R. Wilcox[i,3], Juha M. Alatalo[j,k], John P. Anderson[l], Rien Aerts[m], Sara G. Baer[n,4], Andrew H. Baldwin[o], Jonathan Bates[p], Carl Beierkuhnlein[q], R. Travis Belote[r], John Blair[s], Juliette M. G. Bloor[t], Patrick J. Bohlen[u], Edward W. Bork[v], Elizabeth H. Boughton[w], William D. Bowman[x], Andrea J. Britton[y], James F. Cahill Jr.[z], Enrique Chaneton[aa], Nona R. Chiariello[bb], Jimin Cheng[cc], Scott L. Collins[dd], J. Hans C. Cornelissen[m], Guozhen Du[ee], Anu Eskelinen[ff,gg,hh], Jennifer Firn[ii], Bryan Foster[jj,kk], Laura Gough[ll], Katherine Gross[mm,nn], Lauren M. Hallett[oo,pp], Xingguo Han[qq], Harry Harmens[rr], Mark J. Hovenden[ss], Annika Jagerbrand[tt], Anke Jentsch[uu], Christel Kern[vv], Kari Klanderud[ww], Alan K. Knapp[xx,yy], Juergen Kreyling[zz], Wei Li[cc], Yiqi Luo[aaa], Rebecca L. McCulley[bbb], Jennie R. McLaren[ccc], J. Patrick Megonigal[a], John W. Morgan[ddd], Vladimir Onipchenko[eee], Steven C. Pennings[fff], Janet S. Prevéy[ggg], Jodi N. Price[hhh], Peter B. Reich[iii,jjj], Clare H. Robinson[kkk], F. Leland Russell[f], Osvaldo E. Sala[lll], Eric W. Seabloom[d], Melinda D. Smith[xx,yy], Nadejda A. Soudzilovskaia[mmm], Lara Souza[nnn], Katherine Suding[x], K. Blake Suttle[ooo], Tony Svejcar[ppp], David Tilman[d], Pedro Tognetti[aa], Roy Turkington[qqq,rrr], Shannon White[v], Zhuwen Xu[sss], Laura Yahdjian[aa], Qiang Yu[ttt], Pengfei Zhang[uuu,vvv], and Yunhai Zhang[www,xxx]

PNAS | September 3, 2019 | vol. 116 | no. 36 | 17867–17873

Plant communities are fairly resistant to experimentally manipulated GCDs (Global Change Drivers) in the short term (<10 y). In contrast, long-term (≥10 y) experiments show increasing community divergence of treatments from control conditions. Surprisingly, these community responses occurred with similar frequency across the GCD types manipulated in our database. However, community responses were more common when 3 or more GCDs were simultaneously manipulated, suggesting the emergence of additive or synergistic effects of multiple drivers, particularly over long time periods. In half of the cases, GCD manipulations caused a difference in community composition without a corresponding species richness difference, indicating that species reordering or replacement is an important mechanism of community responses to GCDs and should be given greater consideration when examining consequences of GCDs for the biodiversity–ecosystem function relationship.

La biodiversité s’effondre, épisode 31 : les plantes

Predicting plant conservation priorities on a global scale

Tara A. Pelletier[a], Bryan C. Carstens[b], David C. Tank[c,d,e], Jack Sullivan[c,d], and Anahí Espíndola[f,1]

PNAS | December 18, 2018 | vol. 115 | no. 51 | 13027–13032

Niche syndromes reveal climate-driven extinction threat to island endemic conifers

Kyle C. Rosenblad[1,2*], Daniel L. Perret[1,2] and Dov F. Sax[1,2]

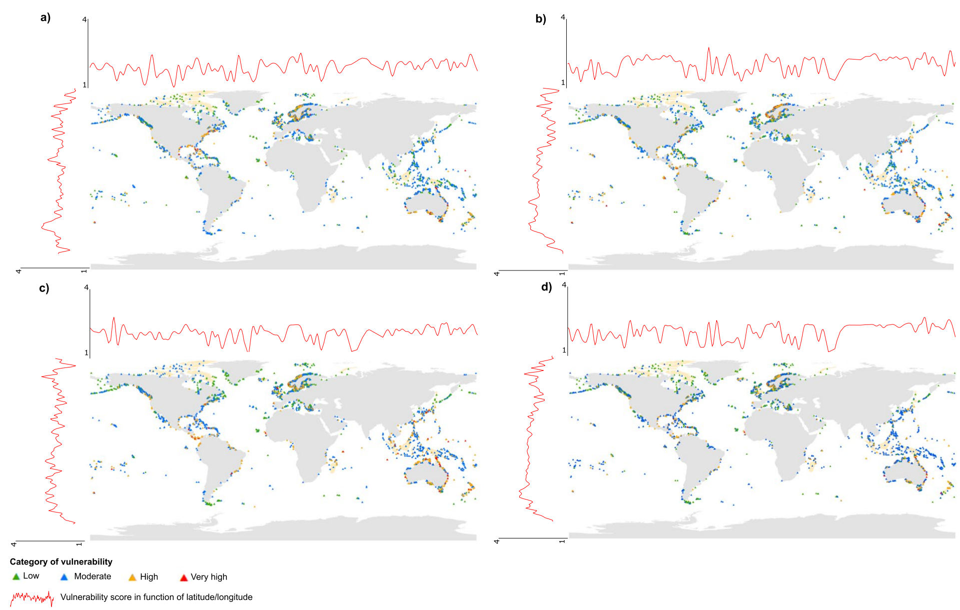
NATURE CLIMATE CHANGE | VOL 9 | AUGUST 2019 | 627–631 |

Vulnerability to climate change of islands worldwide and its impact on the tree of life

Simon Veron[1,2], Maud Mouchet[2], Rafaël Govaerts[3], Thomas Haevermans[1] & Roseli Pellens[1]

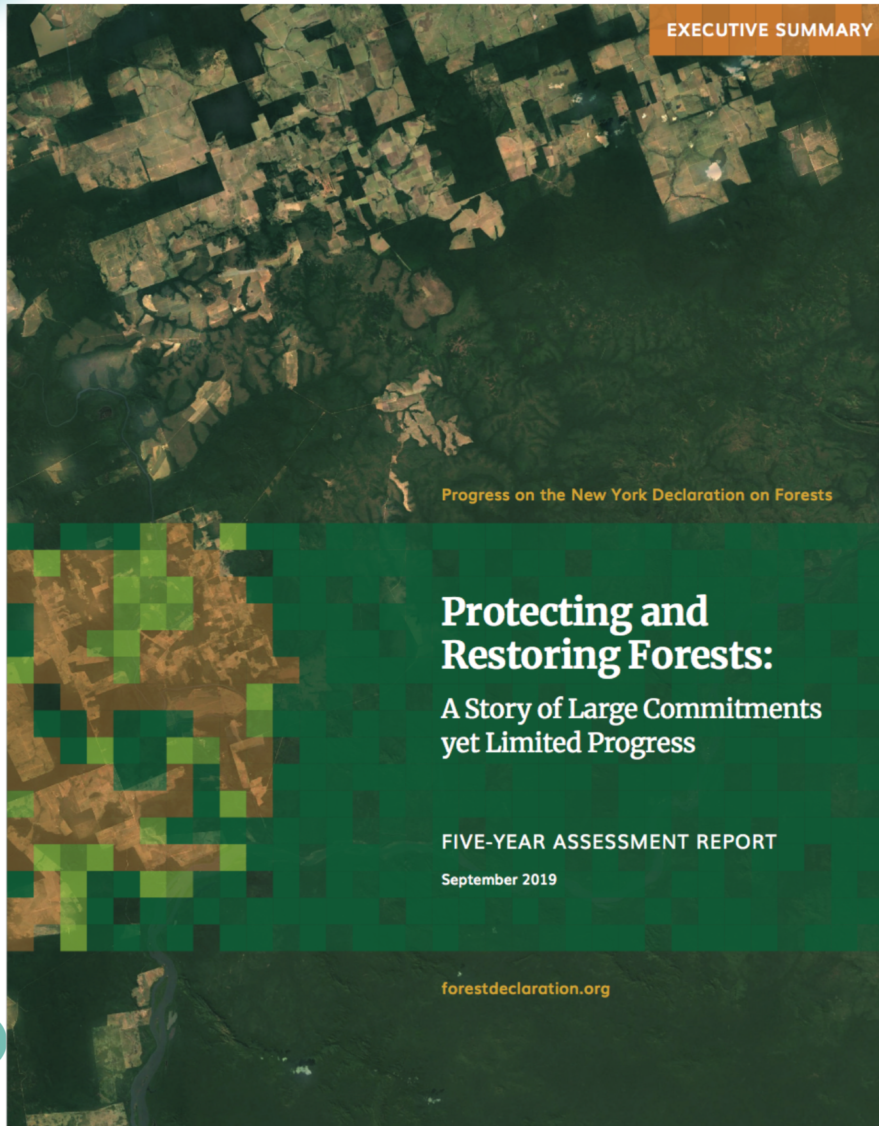
SCIENTIFIC REPORTS | (2019) 9:14471

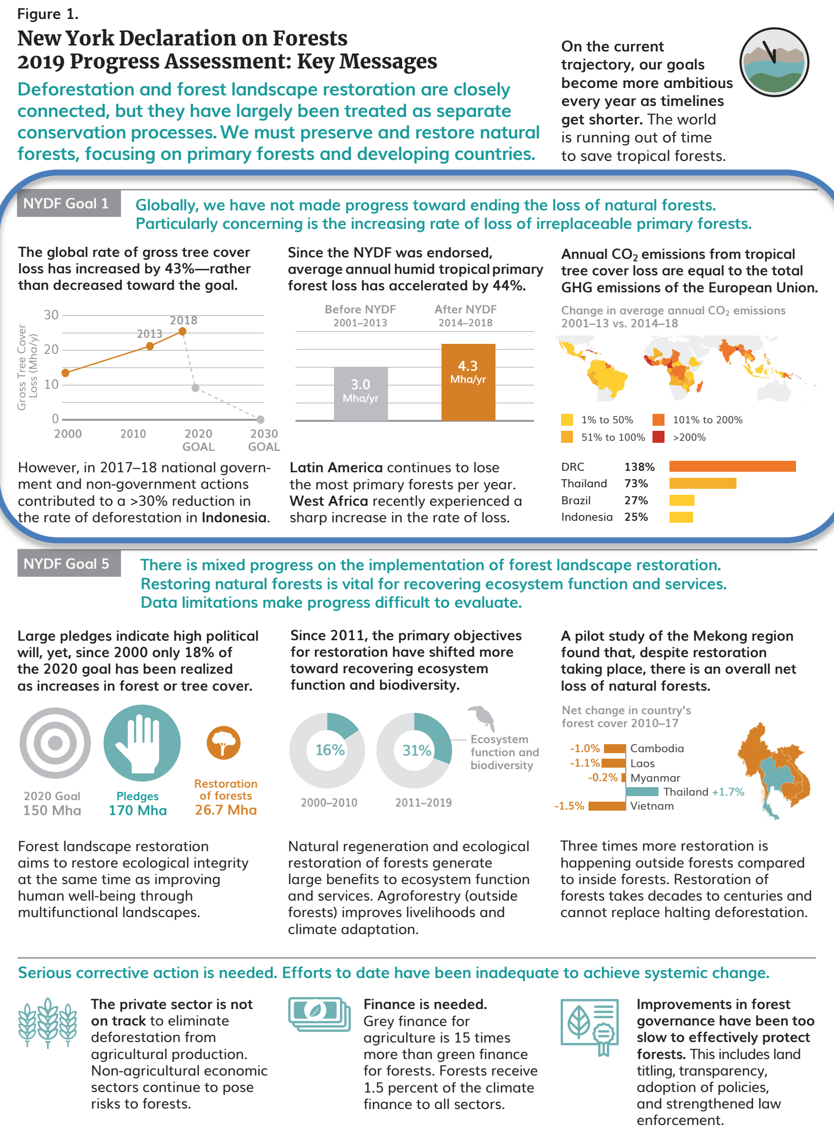
Islands that were vulnerable to climate change were found at all latitudes, e.g. in Australia, Indonesia, the Caribbean, Pacific countries, the United States, although they were more common near the equator. the loss of highly vulnerable islands would lead to relatively low absolute loss of plant phylogenetic diversity. However, these losses tended to be higher than expected by chance alone even in some highly vulnerable insular systems.



FRB FONDATION POUR LA RECHERCHE SUR LA BIODIVERSITÉ

La biodiversité s'effondre, épisode 31 : les plantes





La biodiversité s'effondre, épisode 31 : les plantes

Pour en savoir plus :

Crise de la biodiversité : vision catastrophiste ou réalité scientifique ?

Xavier Le Roux est directeur de recherche à l'Inra, membre de l'Académie d'Europe et responsable du réseau européen BiodivERsA.

Jean-François Silvain est président de la Fondation pour la recherche sur la biodiversité.

Le concert des animaux, Frans Snyders (1579-1657)

Et on fait quoi face à ces effondrements ?

Une double approche préconisée par la FRB : réduire rapidement les pressions directes et indirectes et protéger la biodiversité existante

FRB
FONDATION POUR LA RECHERCHE SUR LA BIODIVERSITÉ

Le défi des aires protégées

Dynamics in the global protected-area estate since 2004

Edward Lewis,[1]* Brian MacSharry,[1] Diego Juffe-Bignoli,[1] Nyeema Harris,[2] Georgina Burrows,[3] Naomi Kingston,[1] and Neil D. Burgess[1,4]

Conservation Biology
Volume 33, No. 3, 2019

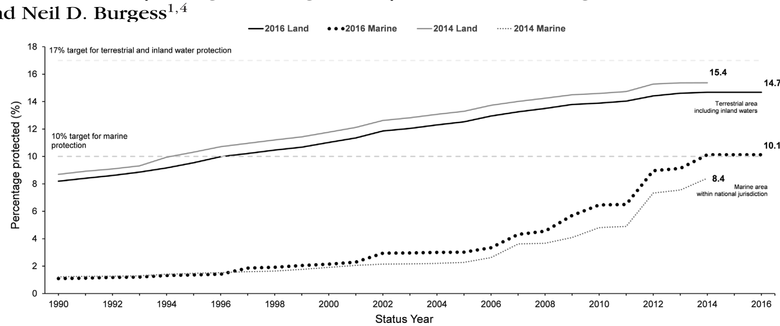


Figure 1. Protected-area growth calculated from the 2014 and 2016 versions of the World Database on Protected Areas (WDPA) with the established method (status year, field used for analysis, and year in which areas were gazetted).

Sixty years of tracking conservation progress using the World Database on Protected Areas

Heather C. Bingham[1]*, Diego Juffe Bignoli[1], Edward Lewis[1], Brian MacSharry[1,2], Neil D. Burgess[1,3], Piero Visconti[4,5], Marine Deguignet[1], Murielle Misrachi[1], Matt Walpole[6], Jessica L. Stewart[1], Thomas M. Brooks[7] and Naomi Kingston[1] NATURE ECOLOGY & EVOLUTION | VOL 3 | MAY 2019 | 737–743 |

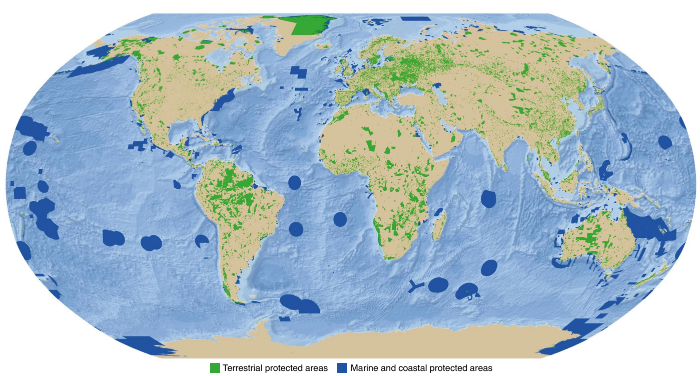


Fig. 1 | Map of the world, showing the locations of protected areas on land and in the ocean, based on spatial data derived from the WDPA[43]. Source: UNEP-WCMC and IUCN (2019). Protected Planet: The World Database on Protected Areas (WDPA, January 2019, Cambridge, UK: UNEP-WCMC. Available at www.protectedplanet.net (accessed January 2019).

Changes in area and number of nature reserves in China

Zhijun Ma,[1]* Ying Chen,[1] David S. Melville,[2] Jun Fan,[1] Jianguo Liu,[3] Jinwei Dong,[4] Kun Tan,[1] Xuefei Cheng,[1] Richard A. Fuller,[5] Xiangming Xiao,[1,6] and Bo Li[1]

Conservation Biology
Volume 33, No. 5, 2019

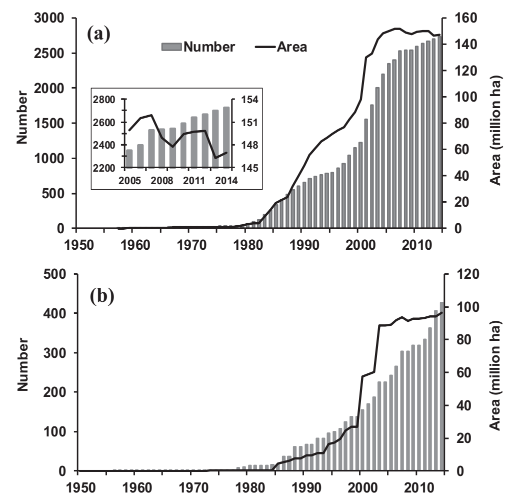


Figure 1. Number and total area of all China's (a) nature reserves and (b) national nature reserves (the most strictly protected nature reserves) from 1956 to 2014. Insert shows changes in China's nature reserves from 2005 to 2014.

Le défi des aires protégées

A global-level assessment of the effectiveness of protected areas at resisting anthropogenic pressures

Jonas Geldmann[a,1], Andrea Manica[b], Neil D. Burgess[a,c,d], Lauren Coad[c,e], and Andrew Balmford[a]

PNAS | November 12, 2019 | vol. 116 | no. 46 | 23209–23215

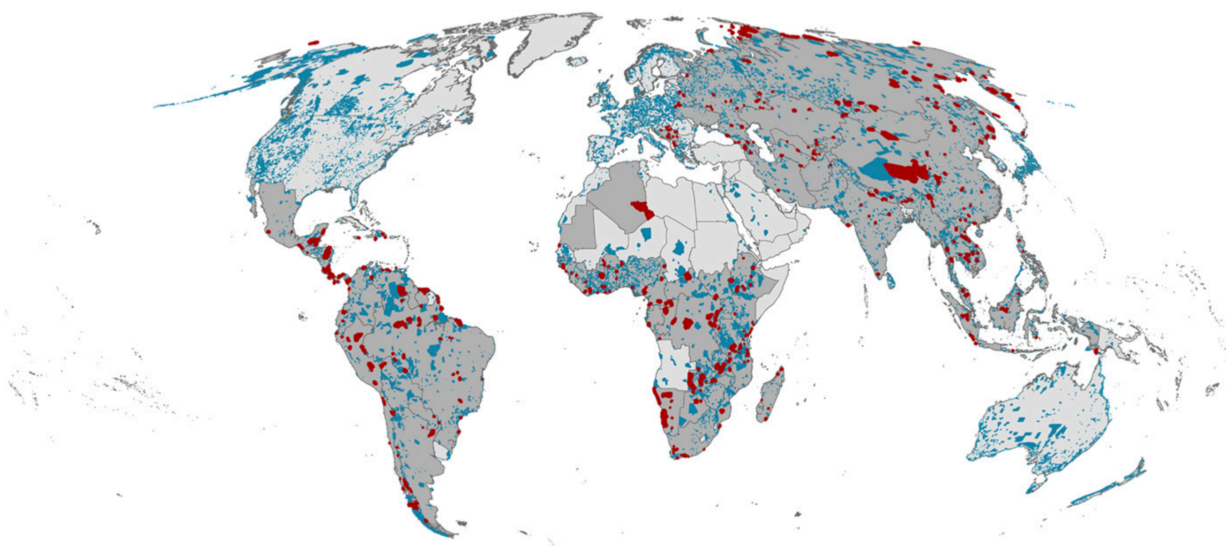


Fig. 1. Map of the 12,315 PAs existing in 1995 (blue) from the 152 countries included in the analysis, across Afrotropic = 2,278, Australasia = 871, Indomalaya = 927, Nearctic = 2,468, Neotropic = 1,033, and Palearctic = 4,738 as well as the 407 PAs for which METT data existed (crimson). Dark gray shows the countries for which we had METT data.

While many PAs show positive outcomes, strikingly we find that compared with matched unprotected areas, PAs have on average not reduced a compound index of pressure change over the past 15 y.

Moreover, in tropical regions average pressure change from cropland conversion has increased inside PAs even more than in matched unprotected areas.

However, our results also confirm previous studies restricted to forest PAs, where pressures are increasing, but less than in counterfactual areas.

Our results also show that countries with high national-level development scores have experienced lower rates of pressure increase over the past 15 y within their PAs compared with a matched outside area.

Our results caution against the rapid establishment of new PAs without simultaneously addressing the conditions needed to enable their success.

Le défi des aires protégées

PROTECTED AREAS

The uncertain future of protected lands and waters

Rachel E. Golden Kroner[1,2*], Siyu Qin[2,3], Carly N. Cook[4], Roopa Krithivasan[5], Shalynn M. Pack[6], Oscar D. Bonilla[7], Kerry Anne Cort-Kansinally[8], Bruno Coutinho[9], Mingmin Feng[2,10], Maria Isabel Martínez Garcia[9], Yifan He[2], Chris J. Kennedy[1], Clotilde Lebreton[11], Juan Carlos Ledezma[12], Thomas E. Lovejoy[1], David A. Luther[13], Yohan Parmanand[8], César Augusto Ruíz-Agudelo[14], Edgard Yerena[15], Vilisa Morón Zambrano[15], Michael B. Mascia[2]

Golden Kroner *et al.*, *Science* **364**, 881–886 (2019)   31 May 2019

We documented legal changes—protected area downgrading, downsizing, and degazettement (PADDD) events—in the United States and Amazonian countries and compiled available data globally. Governments of the United States and Amazonian countries enacted 269 and 440 PADDD events, respectively.

Between 1892 and 2018, 73 countries enacted 3749 PADDD events, removing 519,857 square kilometers from protection and tempering regulations in an additional 1,659,972 square kilometers; 78% of events were enacted since 2000.

Most PADDD events (62%) are associated with industrial-scale resource extraction and development, suggesting that PADDD may compromise biodiversity conservation objectives. Strategic policy responses are needed to address PADDD and sustain effective protected areas.

PADDD = RRDAP
Rétrogradation, réduction et déclassement des aires protégées

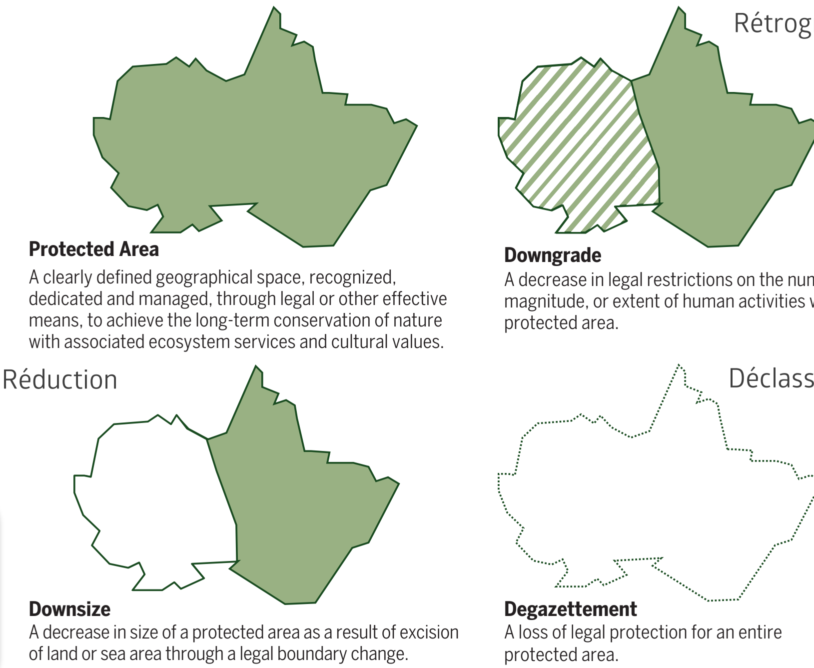


Fig. 1. Protected area downgrading, downsizing, and degazettement. PAs are defined in (*2*); downgrading, downsizing, and degazettement are defined in (*4*). PADDD events are legal (de jure) changes, as distinct from (but potentially related to) de facto PA management and performance.

CONSERVATION

Losing ground in protected areas?

By **Lisa Naughton-Treves[1]** *and* **Margaret Buck Holland[2]**

Saving biodiversity requires reducing extractive pressures and engaging local communities in management

Science 31 MAY 2019 • VOL 364 ISSUE 6443

Le défi des aires protégées

Cross-boundary human impacts compromise the Serengeti-Mara ecosystem

Michiel P. Veldhuis[1]*, Mark E. Ritchie[2], Joseph O. Ogutu[3], Thomas A. Morrison[4], Colin M. Beale[5], Anna B. Estes[6,7], William Mwakilema[8], Gordon O. Ojwang[1,9], Catherine L. Parr[10,11,12], James Probert[10], Patrick W. Wargute[9], J. Grant C. Hopcraft[4], Han Olff[1]

Veldhuis *et al.*, *Science* **363**, 1424–1428 (2019)

Protected areas provide major benefits for humans in the form of ecosystem services, but landscape degradation by human activity at their edges may compromise their ecological functioning. Using multiple lines of evidence from 40 years of research in the Serengeti-Mara ecosystem, we find that such edge degradation has effectively "squeezed" wildlife into the core protected area and has altered the ecosystem's dynamics even within this 40,000-square-kilometer ecosystem. This spatial cascade reduced resilience in the core and was mediated by the movement of grazers, which reduced grass fuel and fires, weakened the capacity of soils to sequester nutrients and carbon, and decreased the responsiveness of primary production to rainfall. Similar effects in other protected ecosystems worldwide may require rethinking of natural resource management outside protected areas.

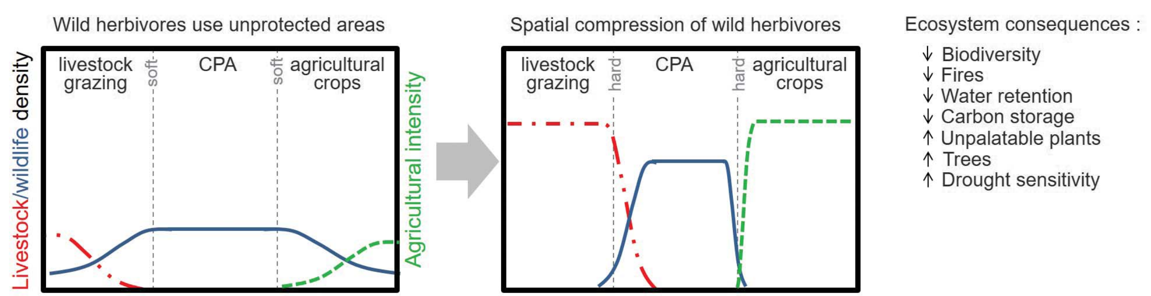


Fig. 1. The concept of spatial compression in PAs. Unsustainable activities outside a soft-edge CPA resulting from human population growth spatially compress wildlife, leading to more intense use of protected land and multiple possible consequences for the magnitude and stability of ecosystem processes and services. Increased human population, livestock densities, and/or agricultural intensities convert soft borders that effectively extend the CPA (left) into hard borders that effectively compress the CPA (right). Lines represent hypothesized wildlife (blue) and livestock (red) densities and agricultural intensity (green).

Le défi des aires protégées

Marine protected areas in the 21st century: Current situation and trends

María Maestro[a,*], Mª Luisa Pérez-Cayeiro[a], Juan Adolfo Chica-Ruiz[a], Harry Reyes[b]

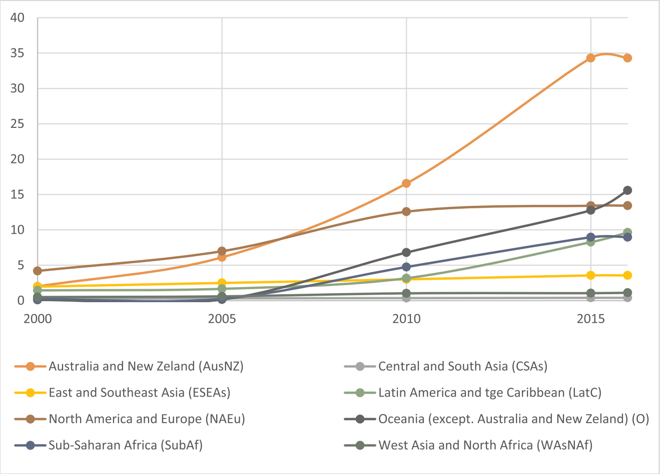
Ocean and Coastal Management 171 (2019) 28–36

Since the beginning of this century, the criteria used to establish MPAs have been unified throughout the planet. However, the planning and management of these spaces differs between various regions. Three main achievements have been identified since the last decade:

- 1) There is a tendency towards the implementation of an ecosystem approach, widely extended in both the terrestrial and marine environment, which gives greater importance to the maintenance of ecosystem services;
- 2) It is recognised that MPAs are an effective instrument to mitigate the effects of climate change;
- 3) To achieve effective protection, it is recommended that MPAs are established beyond waters under national jurisdiction, which is where the majority are concentrated today. Notably, despite international recommendations and the efforts made by governments and institutions, the oceans remain one of the ecosystems most affected by the development of human activities.

Table 1
The 10 largest marine protected areas in the world. *Source:* UNEP-WCMC and IUCN (2018).

Protected Marine Area	Region	Year of declaration	Surface (km^2)
Region of the Ross Sea (ABNJ)	ABNJ	2017	2 060 058
Marae Moana: Cook Islands Marine Park (Cook Islands)	O	2017	1 982 029
National Reserve of the French Southern Lands (France)	NAEu	2016	1 655 001
Papahanaumokuakea National Marine Monument (USA)	NAEu	2006	1 516 555
Natural Park of the Coral Sea (New Caledonia, France)	NAEu	2014	1 291 643
United States Minor Outlying Islands of the Pacific (USA)	NAEu	2009	1 277 784
South Georgia and the South Sandwich Islands (The United Kingdom)	NAEu	2012	1 069 872
Coral Sea (Australia)	AusNZ	2012	995 261
Steller Sea Lion Protection Areas (USA)	NAEu	2002	866 717
Pitcairn Islands Marine Reserve (The United Kingdom)	NAEu	2016	839 568



Graph 2. Evolution of the coverage of MPAs over time, as a percentage of different regions of the world. *Source: Prepared by the authors using data from the* United Nations Statitics Division (2017).

Le défi des aires protégées

Marine partially protected areas: drivers of ecological effectiveness

Mirta Zupan[1†], Eliza Fragkopoulou[1,2†], Joachim Claudet[3,4], Karim Erzini[2], Bárbara Horta e Costa[1,2,3,4], and Emanuel J Gonçalves[1*]

Front Ecol Environ 2018; 16(7): 1–7,

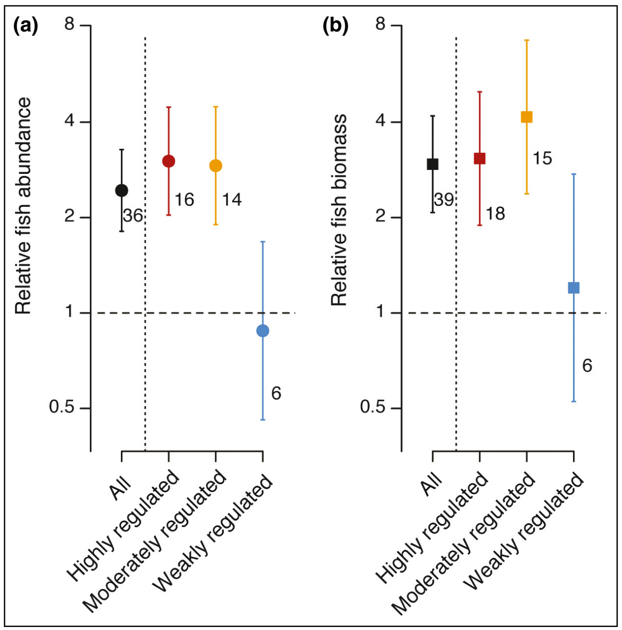


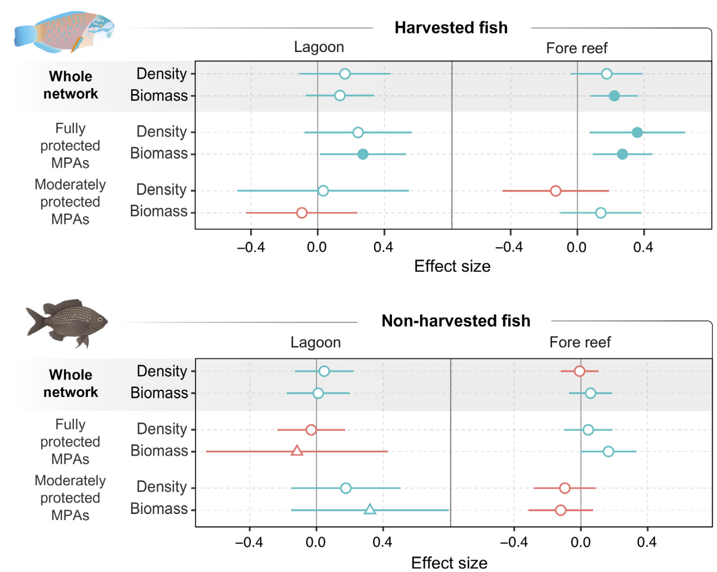
Figure 1. Ecological effectiveness of partially protected areas (PPAs) for (a) abundance and (b) biomass of targeted fish species for all PPAs combined and for PPAs grouped by class (sensu Horta e Costa *et al.* 2016). The horizontal dotted line at 1 represents equal fish abundance or biomass within and outside the PPA; values greater than 1 indicate more fish (or more biomass) within the PPA; values below 1 indicate fewer fish (or less biomass) within the PPA. The bars represent 95% confidence intervals. Sample sizes for each group are shown.

esa ECOSPHERE

Ecological evaluation of a marine protected area network: a progressive-change BACIPS approach

L. Thiault,[1,2,3,4,†] L. Kernaléguen,[5] C. W. Osenberg,[6] T. Lison de Loma,[1,2] Y. Chancerelle,[1,2] G. Siu,[1,2] and J. Claudet[1,2]

February 2019 ❖ Volume 10(2) ❖ Article e02576



Fully protected areas provided greater ecological benefits than moderately protected areas. In the lagoon, density and biomass of harvested fishes increased, but only the 31% increase in bio- mass in fully protected MPAs was significant. Non-harvested fishes did not respond to protection in any of the habitats.

Le défi des aires protégées

How good is your marine protected area at curbing threats?

Mirta Zupan[a,*], Fabio Bulleri[b], Julian Evans[c], Simonetta Fraschetti[d], Paolo Guidetti[e], Antoni Garcia-Rubies[f], Marta Sostres[a], Valentina Asnaghi[g], Anthony Caro[a], Salud Deudero[h], Raquel Goñi[h], Giuseppe Guarnieri[d], Francois Guilhaumon[i], Diego Kersting[j,k], Athina Kokkali[l], Claudia Kruschel[m], Vesna Macic[n], Luisa Mangialajo[o,p], Sandra Mallol[h], Enrique Macpherson[f], Antonella Panucci[l], Mirko Radolovic[q], Mohamed Ramdani[r], Patrick J. Schembri[c], Antonio Terlizzi[s,t], Elisa Villa[u], Joachim Claudet[v]

Biological Conservation 221 (2018) 237–245

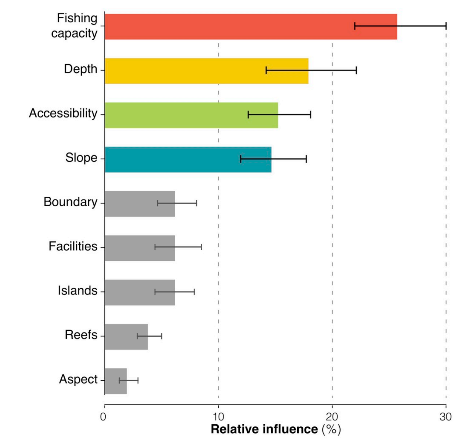
A B S T R A C T

Marine protected areas (MPAs) are key tools to mitigate human impacts in coastal environments, promoting sustainable activities to conserve biodiversity. The designation of MPAs alone may not result in the lessening of some human threats, which is highly dependent on management goals and the related specific regulations that are adopted. Here, we develop and operationalize a local threat assessment framework. We develop indices to quantify the effectiveness of MPAs (or individual zones within MPAs in the case of multiple-use MPAs) in reducing anthropogenic extractive and non-extractive threats operating at local scale, focusing specifically on threats that can be managed through MPAs. We apply this framework in 15 Mediterranean MPAs to assess their threat reduction capacity. We show that fully protected areas effectively eliminate extractive activities, whereas the intensity of artisanal and recreational fishing within partially protected areas, paradoxically, is higher than that found outside MPAs, questioning their ability at reaching conservation targets. In addition, both fully and partially protected areas attract non-extractive activities that are potential threats. Overall, only three of the 15 MPAs had lower intensities for the entire set of eight threats considered, in respect to adjacent control unprotected areas. Understanding the intensity and occurrence of human threats operating at the local scale inside and around MPAs is important for assessing MPAs effectiveness in achieving the goals they have been designed for, informing management strategies, and prioritizing specific actions.

Predicting poaching risk in marine protected areas for improved patrol efficiency☆

Lauric Thiault[a,b,*], Damian Weekers[c,d], Matt Curnock[e], Nadine Marshall[e], Petina L. Pert[e], Roger Beeden[d], Michelle Dyer[d], Joachim Claudet[a,b]

Journal of Environmental Management 254 (2020) 109808



Journal of Environmental Management 254 (2020) 109808

A fast-moving target: achieving marine conservation goals under shifting climate and policies

Gil Rilov,[1,16] Simonetta Fraschetti,[2,3,4] Elena Gissi,[5] Carlo Pipitone,[6] Fabio Badalamenti,[4,6] Laura Tamburello,[3,4] Elisabetta Menini,[7] Paul Goriup,[8] Antonios D. Mazaris,[9] Joaquim Garrabou,[10,11] Lisandro Benedetti-Cecchi,[3,4,12] Roberto Danovaro,[4,7] Charles Loiseau,[13] Joachim Claudet,[13,14] and Stelios Katsanevakis[15]

Ecological Applications, 30(1), 2020, e02009

Le défi des aires protégées

Annual Review of Marine Science

Climate Change, Coral Loss, and the Curious Case of the Parrotfish Paradigm: Why Don't Marine Protected Areas Improve Reef Resilience?

John F. Bruno,[1] Isabelle M. Côté,[2] and Lauren T. Toth[3]

Abstract

Scientists have advocated for local interventions, such as creating marine protected areas and implementing fishery restrictions, as ways to mitigate local stressors to limit the effects of climate change on reef-building corals. However, in a literature review, we find little empirical support for the notion of managed resilience. We outline some reasons for why marine protected areas and the protection of herbivorous fish (especially parrotfish) have had little effect on coral resilience. One key explanation is that the impacts of local stressors (e.g., pollution and fishing) are often swamped by the much greater effect of ocean warming on corals. Another is the sheer complexity (including numerous context dependencies) of the five cascading links assumed by the managed-resilience hypothesis. If reefs cannot be saved by local actions alone, then it is time to face reef degradation head-on, by directly addressing anthropogenic climate change—the root cause of global coral decline.

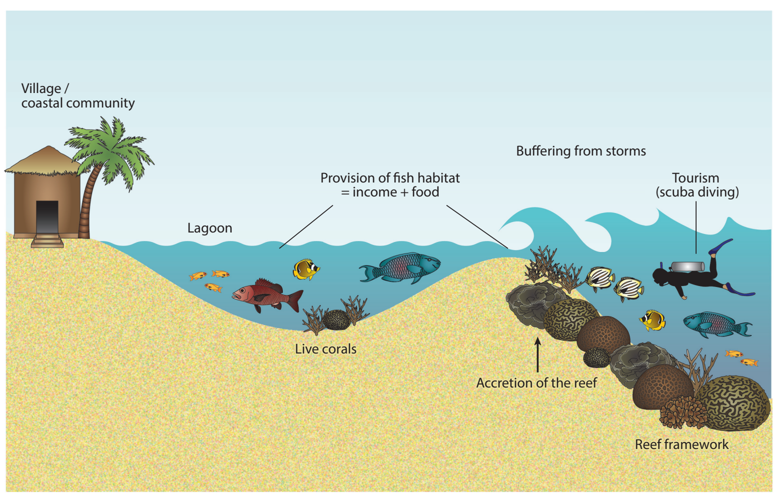


Figure 1
Ecosystem services provided by reefs and some of the geological and ecological features that support these benefits to people.

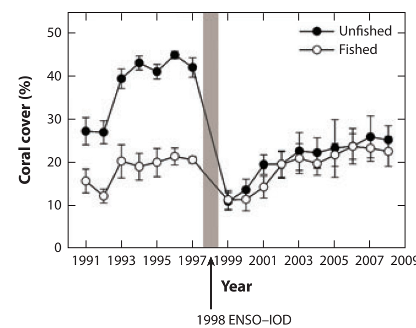


Figure 2
Example of a long-term field study that measured the effect of disturbances on coral cover in unfished (protected) and fished sites. Abbreviations: ENSO, El Niño–Southern Oscillation; IOD, Indian Ocean Dipole. Figure adapted from Darling et al. (2010).

Le défi des aires protégées

Coupled Networks of Permanent Protected Areas and Dynamic Conservation Areas for Biodiversity Conservation Under Climate Change

Cassidy C. D'Aloia[1,2†], Ilona Naujokaitis-Lewis[3†], Christopher Blackford[2], Cindy Chu[4], Janelle M. R. Curtis[5], Emily Darling[2,6], Frédéric Guichard[7], Shawn J. Leroux[8], Alexandre C. Martensen[9], Bronwyn Rayfield[10,11], Jennifer M. Sunday[7], Amanda Xuereb[2] and Marie-Josée Fortin[2]*

Frontiers in Ecology and Evolution | www.frontiersin.org February 2019 | Volume 7 | Article 27

Value of protected areas to avian persistence across 20 years of climate and land-use change

Michelle A. Peach,[1*†] Jonathan B. Cohen,[1] Jacqueline L. Frair,[1] Benjamin Zuckerberg,[2] Patrick Sullivan,[3] William F. Porter,[4] and Corey Lang[5]

Conservation Biology, Volume 33, No. 2, 423–433

Our results indicate that land protection remains a viable conservation strategy despite changing habitat and climate, as protected areas both reduce the risk of local extinction and facilitate movement into new areas. Our findings suggest conservation in the face of climate change favors creation of new protected areas over enlarging existing ones as the optimal strategy to reduce extinction and provide stepping stones for the greatest number of species.

Le défi des aires protégées

ECONOMICS

Evaluating the impacts of protected areas on human well-being across the developing world

R. Naidoo[1,2]*, D. Gerkey[3], D. Hole[4], A. Pfaff[5], A. M. Ellis[6], C. D. Golden[7], D. Herrera[8], K. Johnson[9†], M. Mulligan[10], T. H. Ricketts[11], B. Fisher[11]

Naidoo *et al.*, *Sci. Adv.* 2019; **5**

Protected areas (PAs) are fundamental for biodiversity conservation, yet their impacts on nearby residents are contested. We synthesized environmental and socioeconomic conditions of >87,000 children in >60,000 households situated either near or far from >600 PAs within 34 developing countries. We used quasi-experimental hierarchical regression to isolate the impact of living near a PA on several aspects of human well-being. Households near PAs with tourism also had higher wealth levels (by 17%) and a lower likelihood of poverty (by 16%) than similar households living far from PAs. Children under 5 years old living near multiple-use PAs with tourism also had higher height-for-age scores (by 10%) and were less likely to be stunted (by 13%) than similar children living far from PAs. For the largest and most comprehensive socioeconomic-environmental dataset yet assembled, we found no evidence of negative PA impacts and consistent statistical evidence to suggest PAs can positively affect human well-being.

CONSERVATION

Protected area targets post-2020

Outcome-based targets are needed to achieve biodiversity goals

By Piero Visconti[1,2,3], Stuart H. M. Butchart[4,5], Thomas M. Brooks[6], Penny F. Langhammer[7,8,9], Daniel Marnewick[10], Sheila Vergara[11], Alberto Yanosky[12], James E. M. Watson[13,14]

Science 19 APRIL 2019 • VOL 364 ISSUE 6437

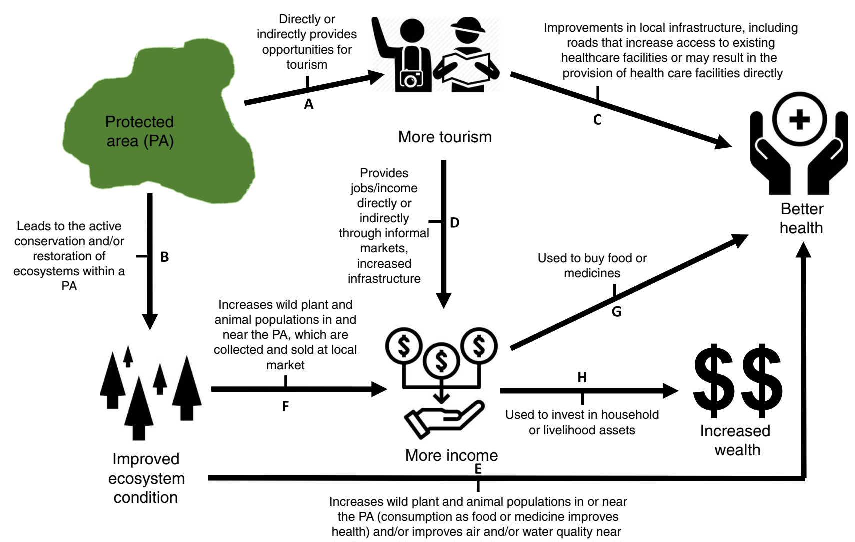


Fig. 2. Conceptualizing PA impacts. Possible mechanisms of PA impacts on the health and wealth of nearby people. Individual pathways can be combined to conceptualize an impact mechanism; e.g., pathway ADG suggests how PAs can lead to better health outcomes via income gains from PA-related tourism employment that are then spent on improving children's health.

Empathy and compassion toward other species decrease with evolutionary divergence time

Aurélien Miralles[1*], Michel Raymond[2,3] & Guillaume Lecointre[1,3]

SCIENTIFIC REPORTS | (2019) 9:19555

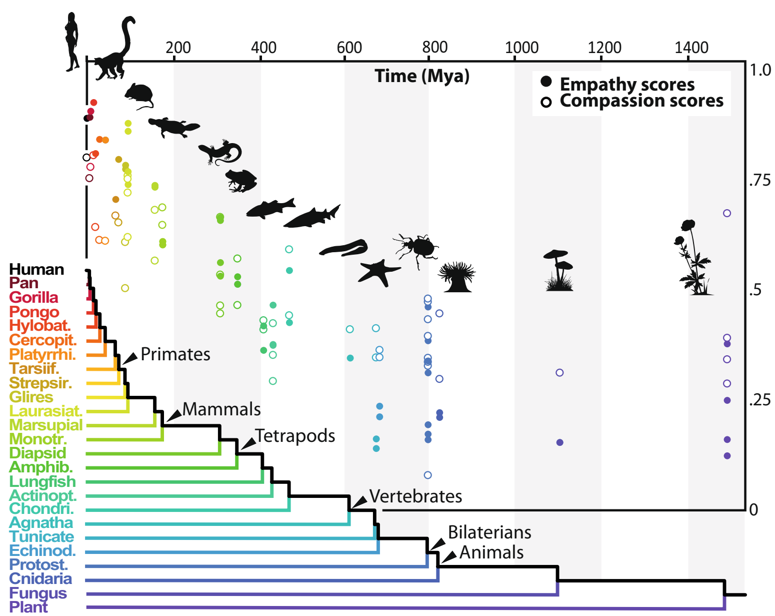


Figure 2. Empathy and compassion scores attributed to each organisms as a function of divergence time (Mya) between them and humans. The scores correspond to the probability that a given species is chosen from a pair of species that includes it and another randomly selected (n = 52 species). See *SI Appendix, Results S1* for details. (Illustrations by A. Miralles).

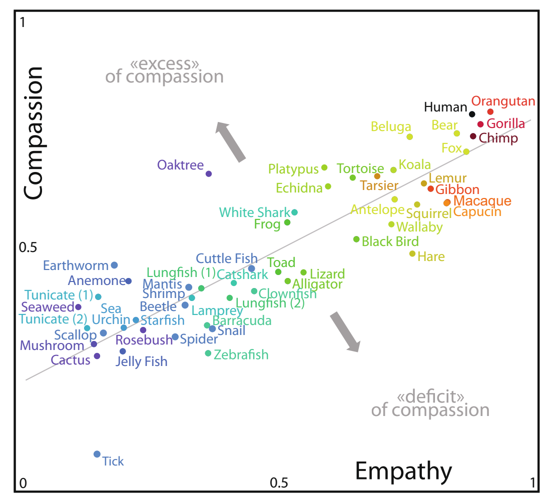


Figure 4. Relationships between empathy and compassion scores. While the oak benefits from an excessive compassion score when compared to its ability to arouse empathy, the tick suffers from a clear compassion deficit (n = 52 species).