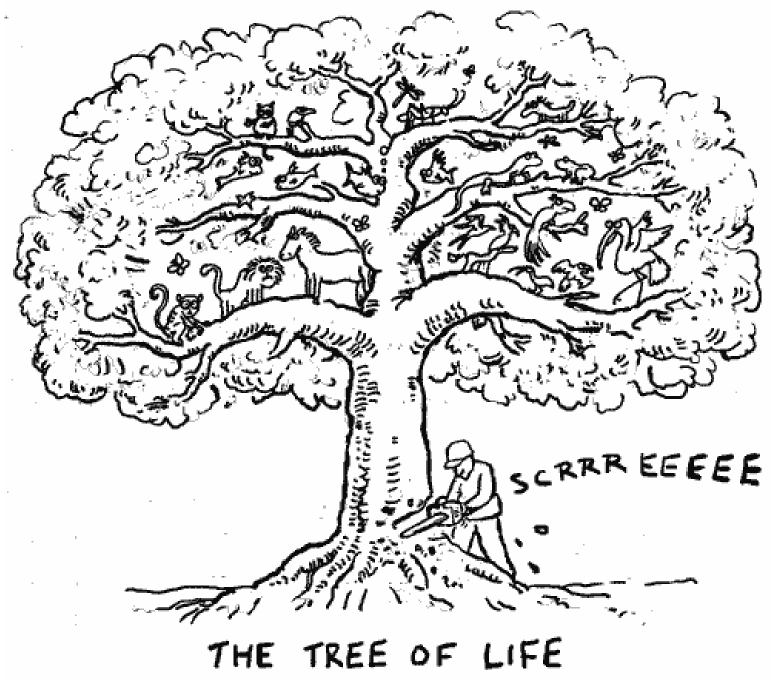
# ¿Qué es la biología de la conservación?



# Material de lectura recomendado para esta clase

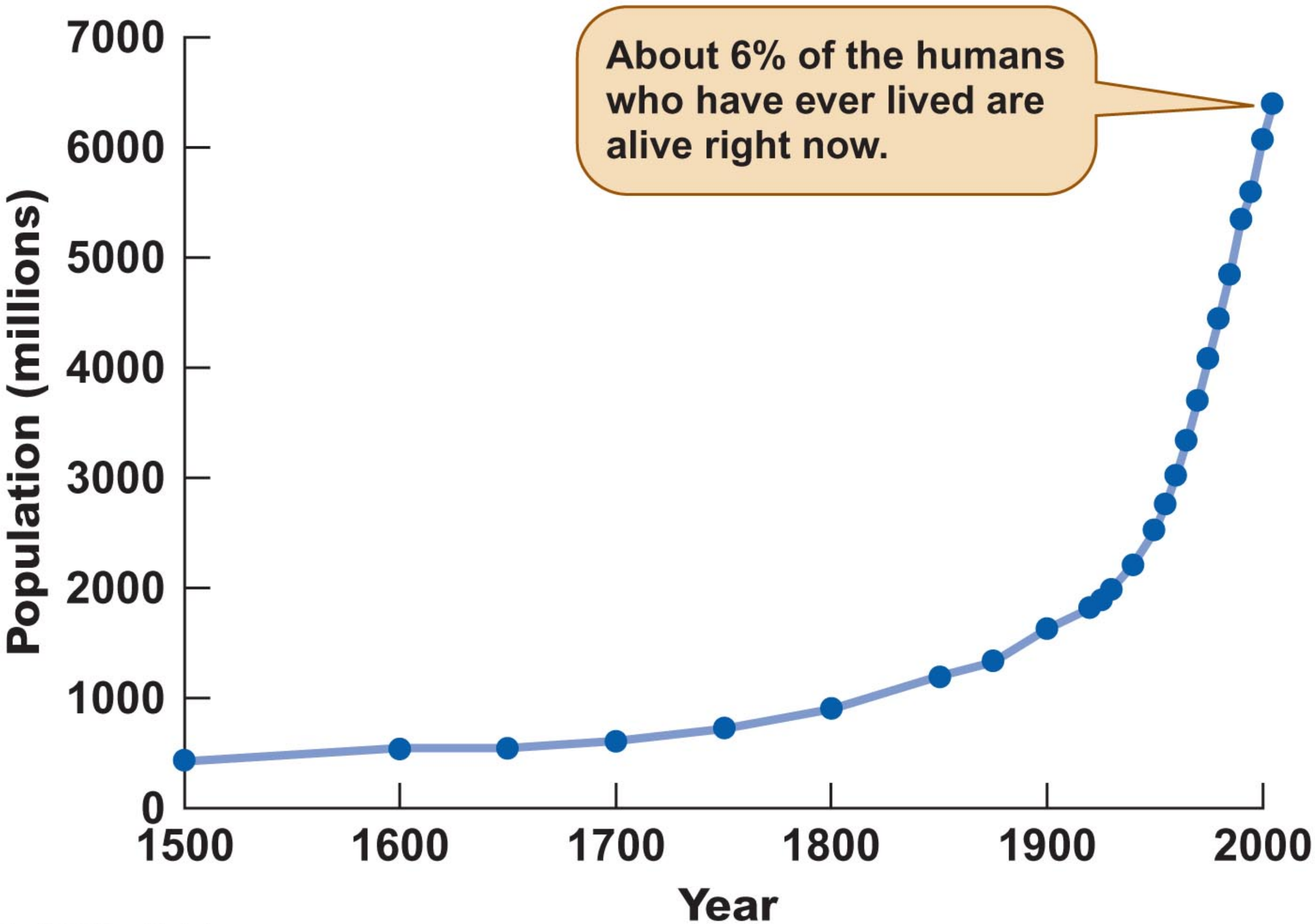
- Groom et al. (2006) Principles of Conservation Biology, cap. 1
- Soulé, M. 1985. What is conservation biology? BioScience 35: 727-734
- Lawler, J. et al. 2006. Conservation science: A 20-year report card. Frontiers in Ecology and the Environment 4: 473-480

# Esquema de la charla

- Crecimiento de la población mundial y el antropoceno.
- La sexta extinción en masa.
- Qué es la biología de la conservación:
  - Historia
  - ¿Qué estudia la biología de la conservación en la actualidad?

# Esquema de la charla

- Crecimiento de la población mundial y el antropoceno.
- La sexta extinción en masa.
- Qué es la biología de la conservación:
  - Historia
  - ¿Qué estudia la biología de la conservación en la actualidad?






Fuente: Krebs (2009) *Ecology*, Benjamin Cummings

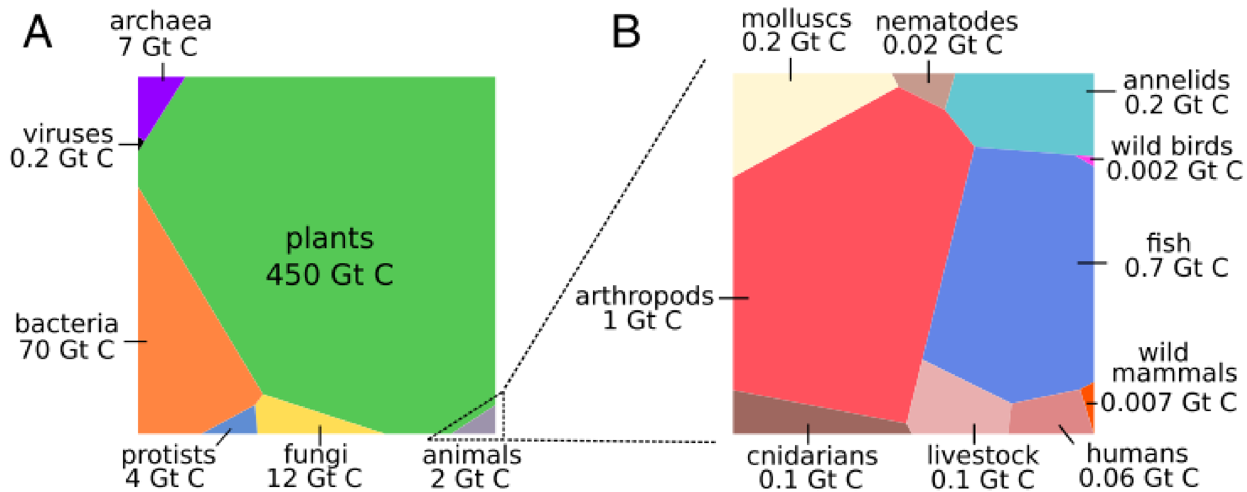
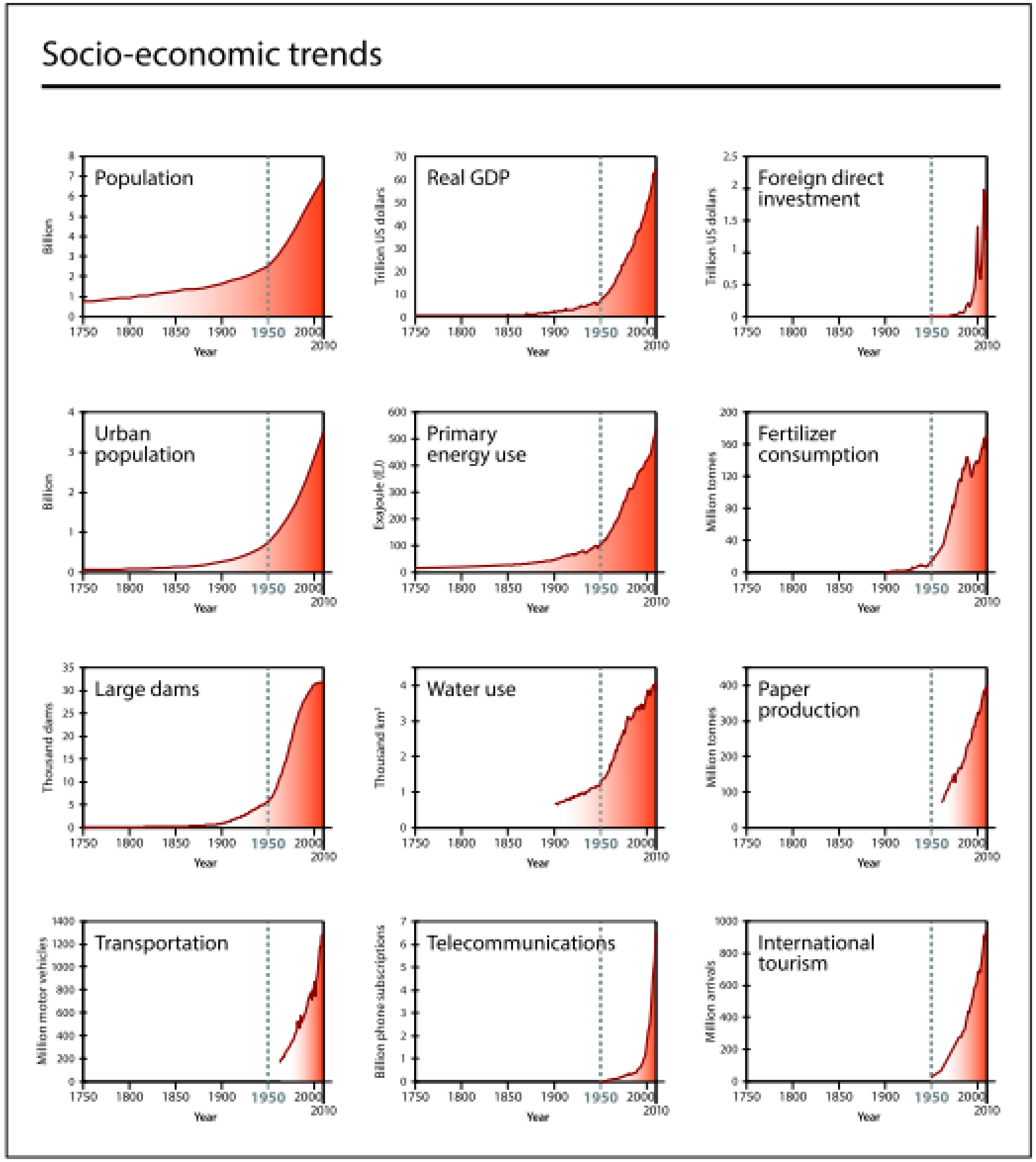
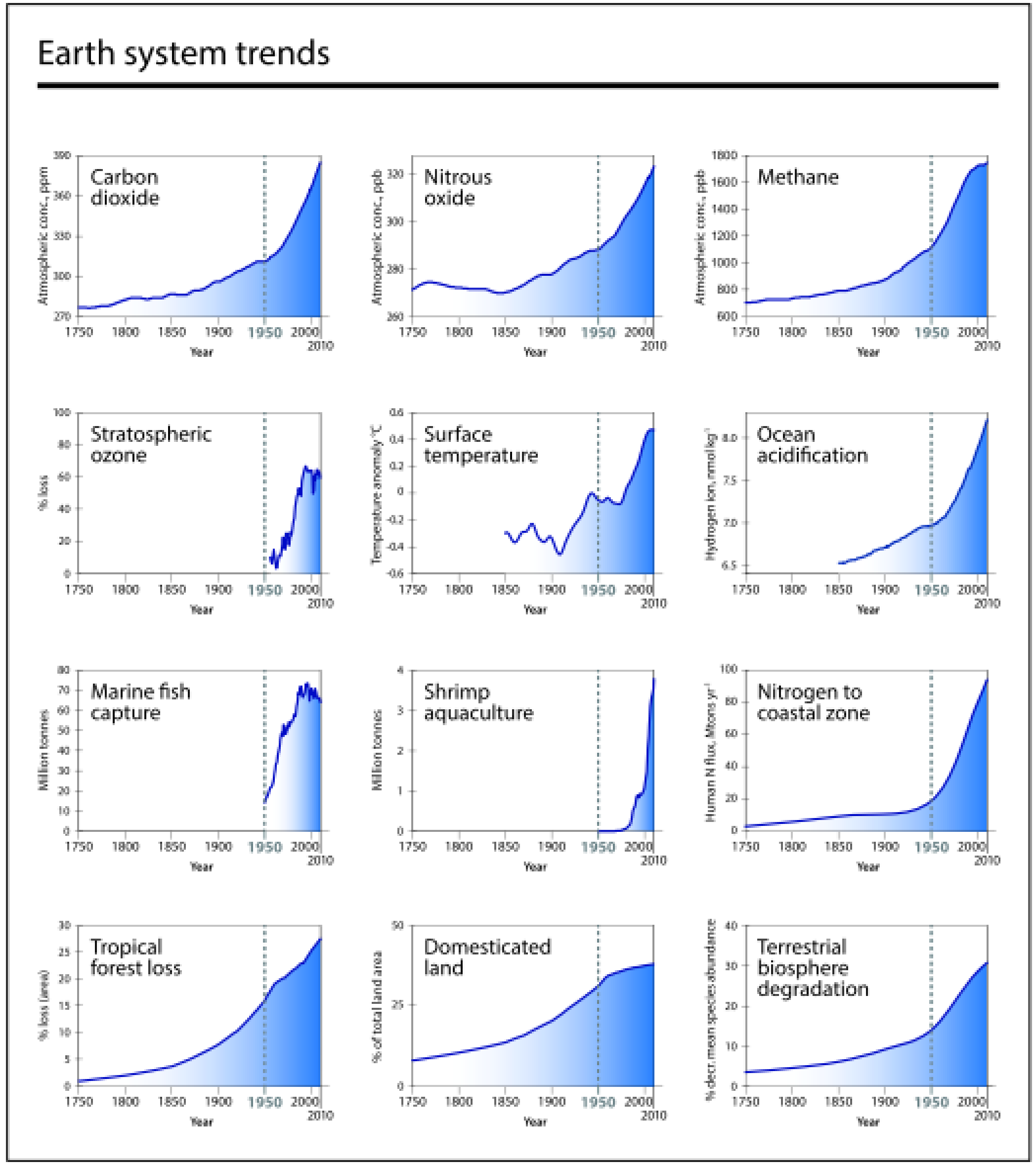



**Fig. 1.** Graphical representation of the global biomass distribution by taxa. (*A*) Absolute biomasses of different taxa are represented using a Voronoi diagram, with the area of each cell being proportional to that taxa global biomass (the specific shape of each polygon carries no meaning). This type of visualization is similar to pie charts but has a much higher dynamic range (a comparison is shown in *SI Appendix*, Fig. S4). Values are based on the estimates presented in Table 1 and detailed in the *SI Appendix*. A visual depiction without components with very slow metabolic activity, such as plant stems and tree trunks, is shown in *SI Appendix*, Fig. S1. (*B*) Absolute biomass of different animal taxa. Related groups such as vertebrates are located next to each other. We estimate that the contribution of reptiles and amphibians to the total animal biomass is negligible, as we discuss in the *SI Appendix*. Visualization performed using the online tool at bionic-vis.biologie.uni-greifswald.de/.

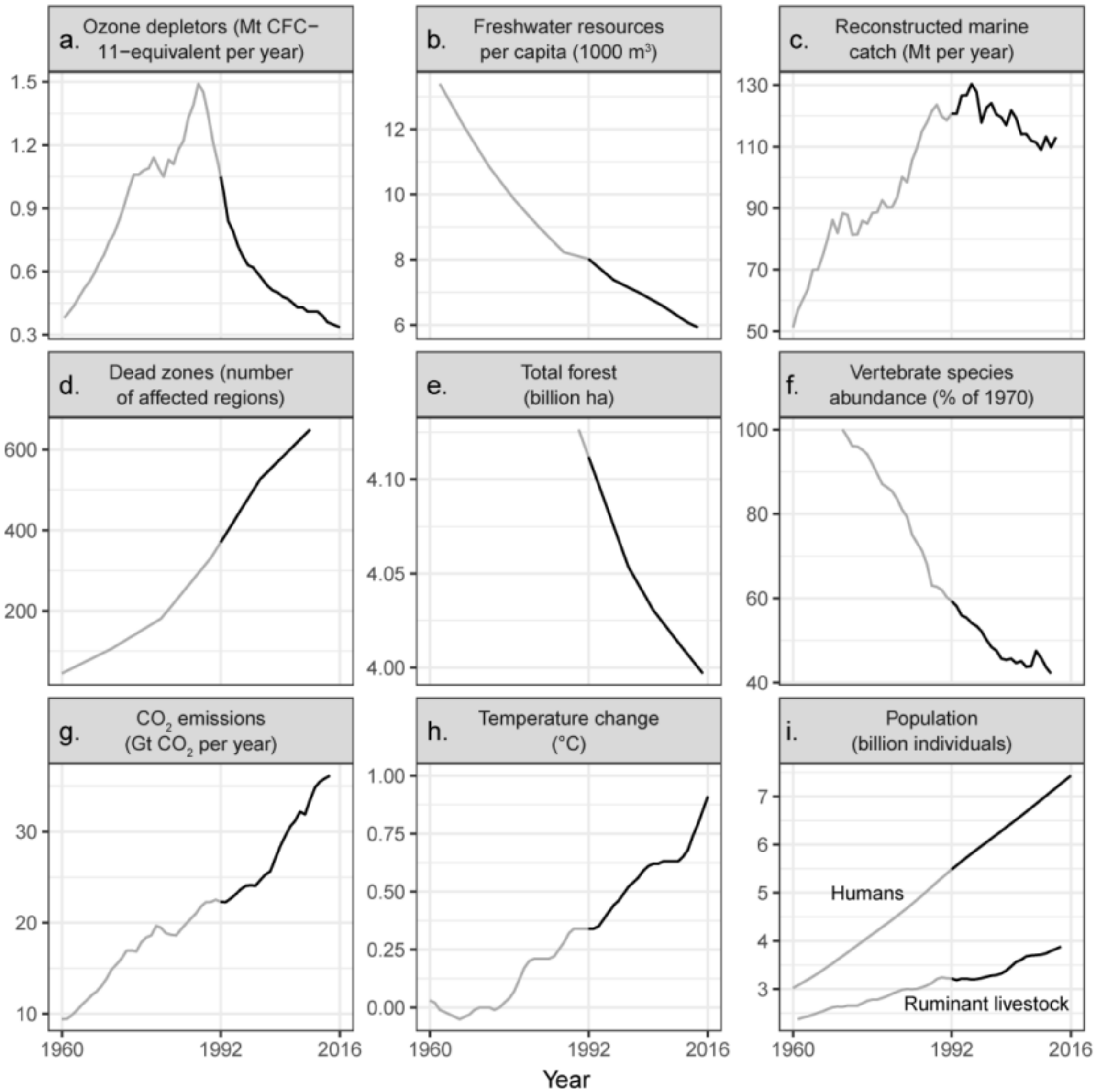
Fuente: Bar-On et al. (2018) PNAS 115: 6506-6511




Fuente: Steffen et al. (2015) The Anthropocene Review 1-18




Fuente: Steffen et al. (2015) The Anthropocene Review 1-18




Fuente: Ripple et al. (2017) BioScience

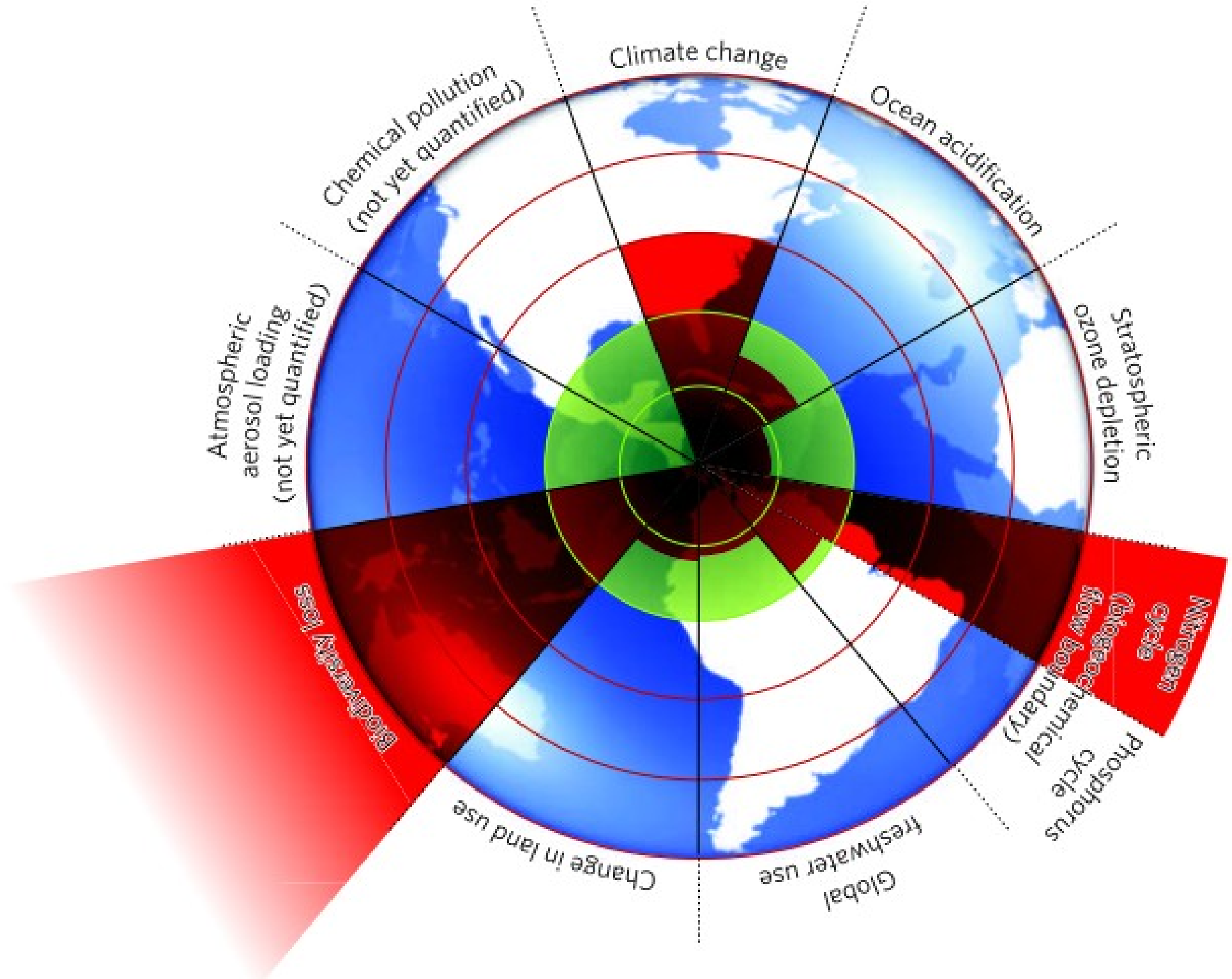
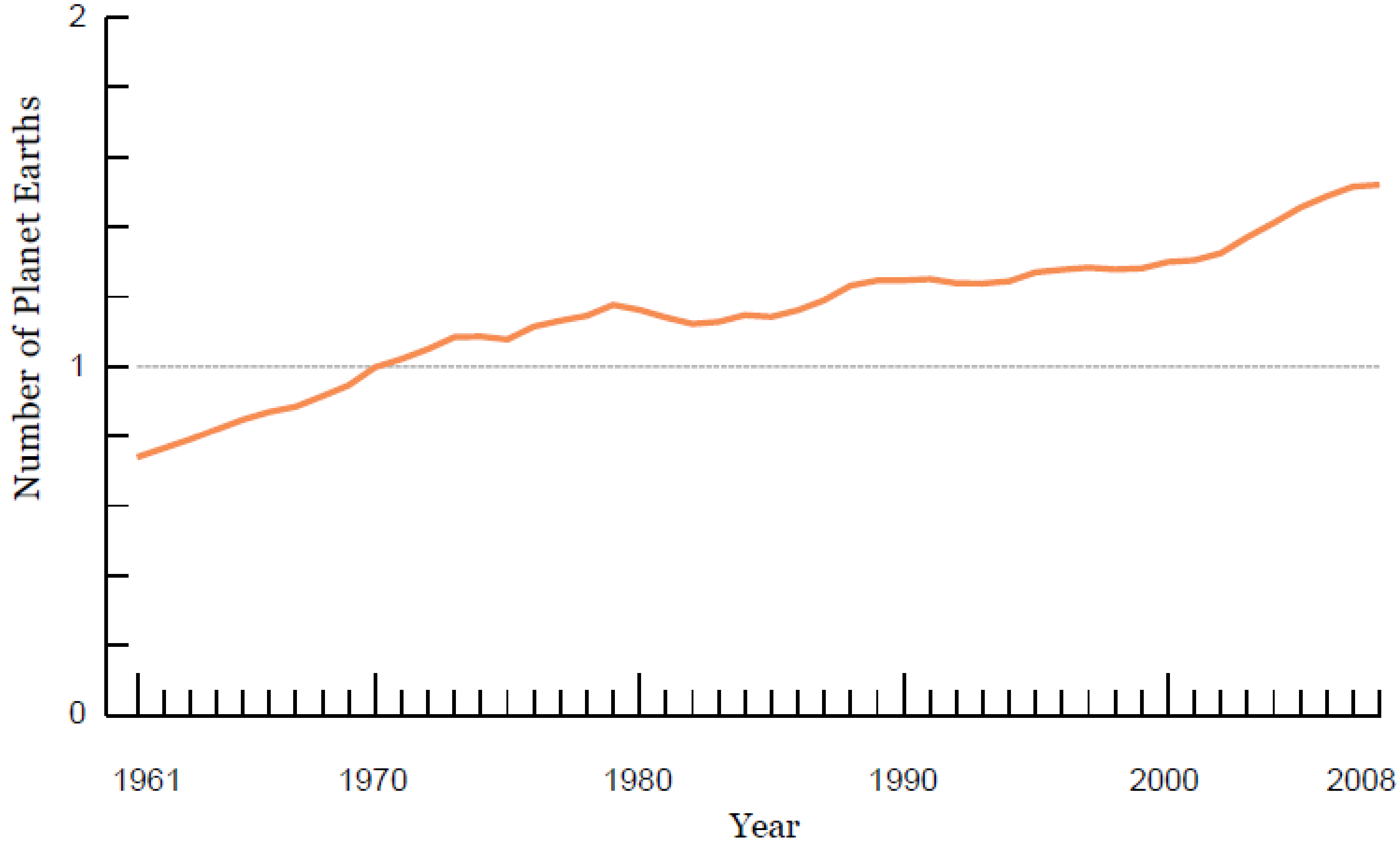



**Figure 1 | Beyond the boundary.** The inner green shading represents the proposed safe operating space for nine planetary systems. The red wedges represent an estimate of the current position for each variable. The boundaries in three systems (rate of biodiversity loss, climate change and human interference with the nitrogen cycle), have already been exceeded.

Fuente: Rockström et al. (2009) Nature 461: 472-475






Fuente: World Wildlife Fund (2012) Living Planet Report

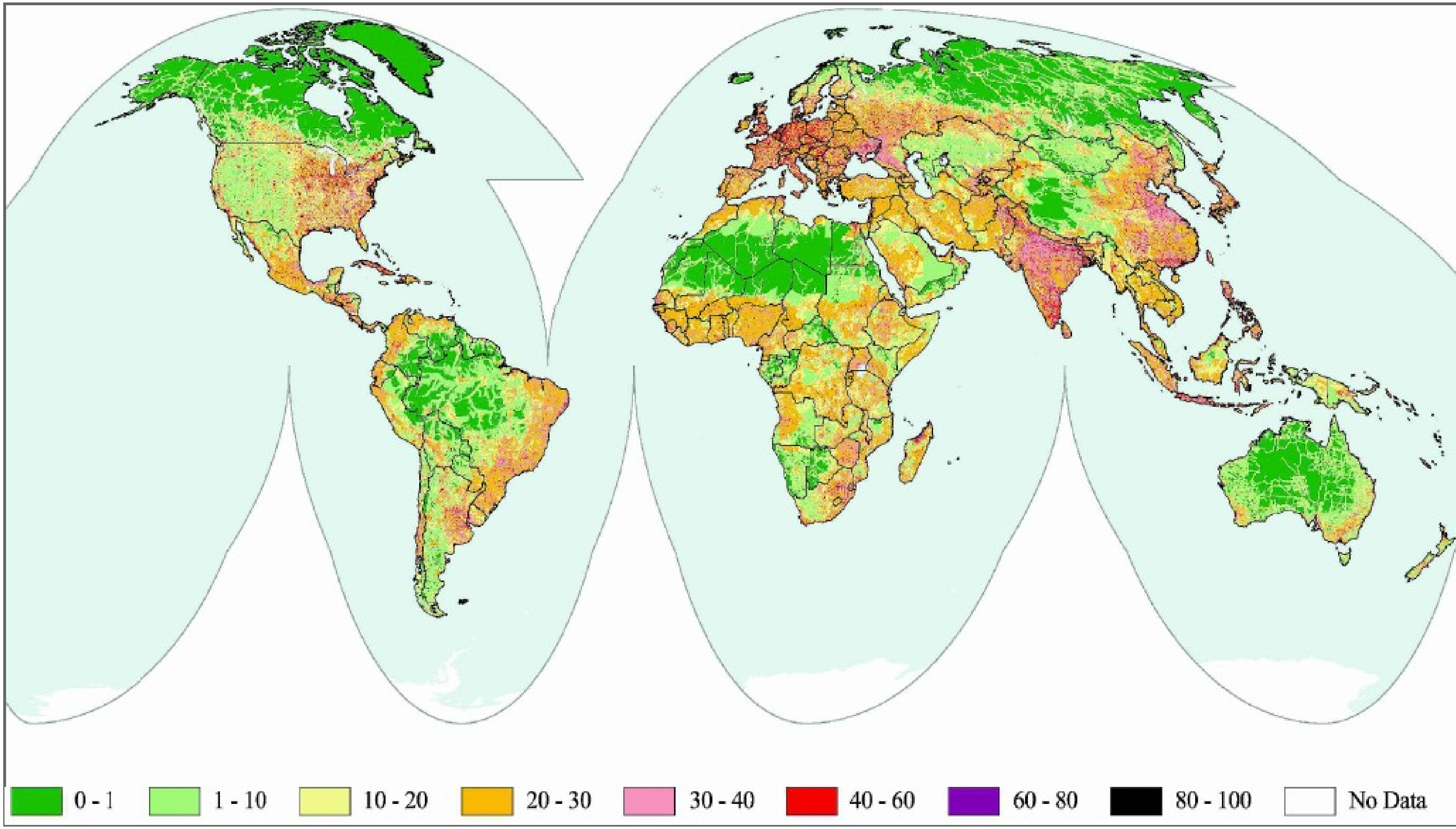
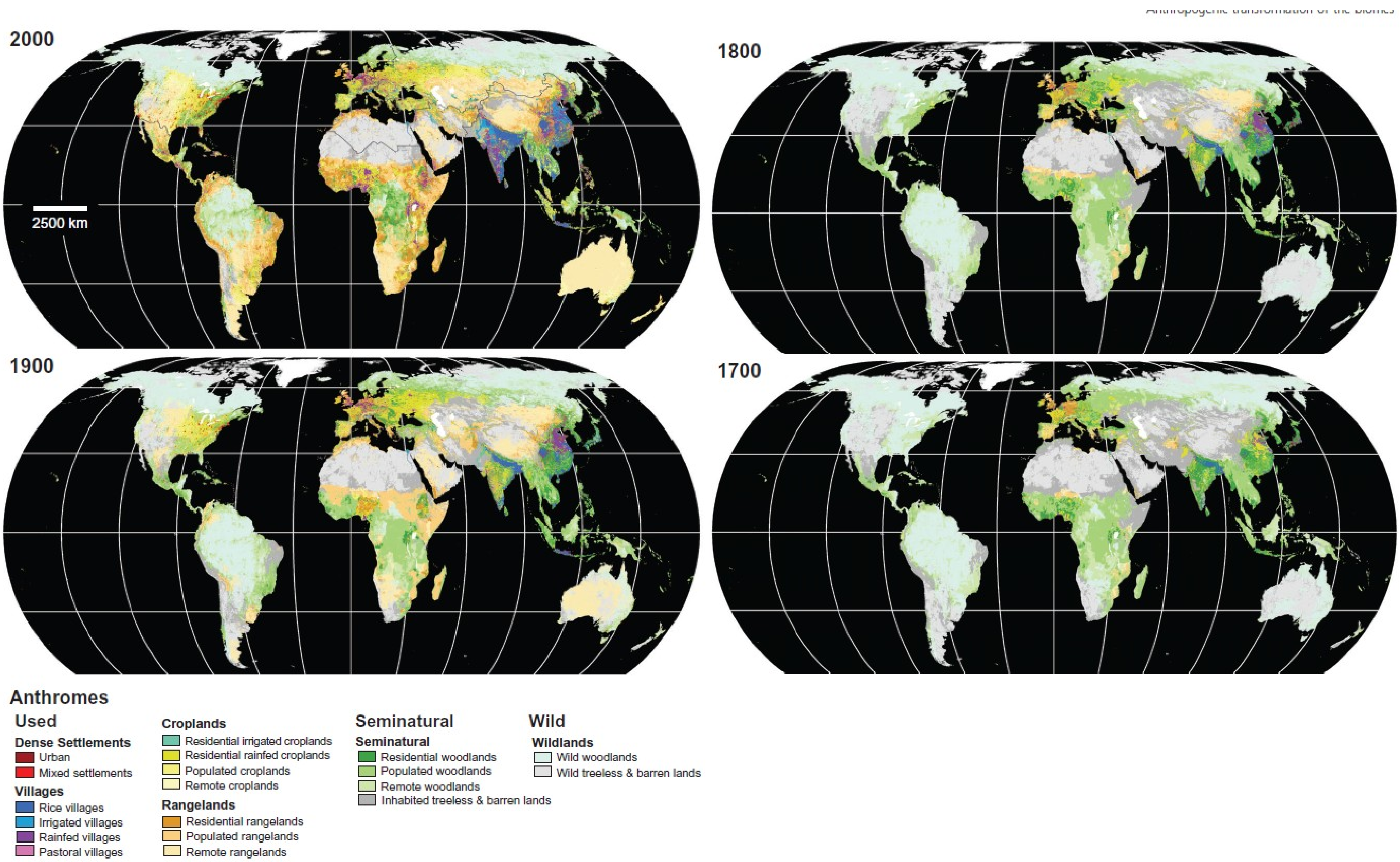



*Figure 3. The human footprint, a quantitative evaluation of human influence on the land surface, based on geographic data describing human population density, land transformation, access, and electrical power infrastructure, and normalized to reflect the continuum of human influence across each terrestrial biome defined within biogeographic realms. Further views and additional information are available at "Atlas of the Human Footprint" Web site,* www.wcs.org/humanfootprint. *Data are available at* www.ciesin.columbia.edu/wild_areas/. *National boundaries are not authoritative.*



Fuente: Sanderson et al. (2002) BioScience 52: 891-904

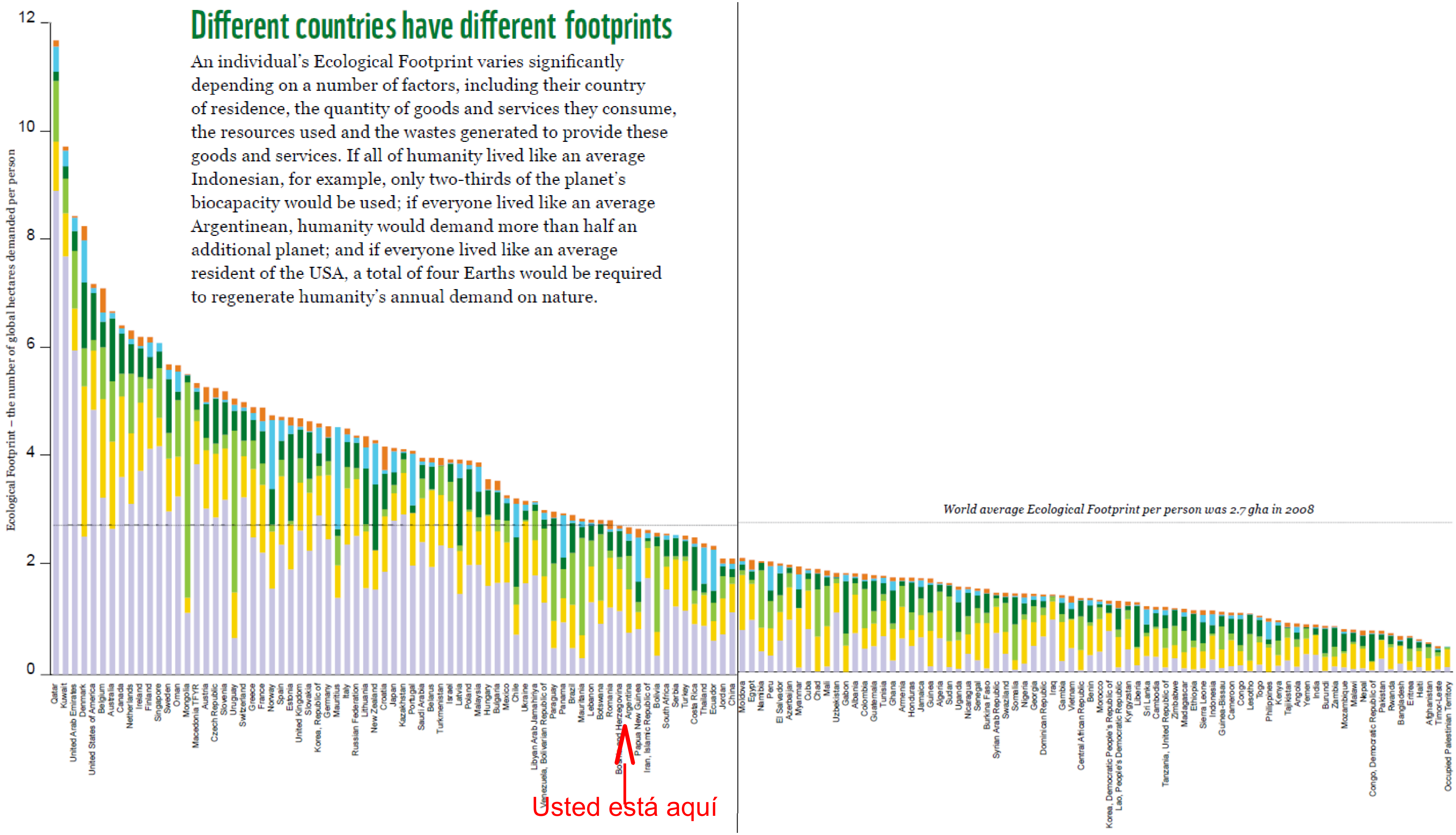





Fuente: Ellis et al. (2010) Glob Ecol Biogeogr 19: 589-606

# Different countries have different footprints

An individual's Ecological Footprint varies significantly depending on a number of factors, including their country of residence, the quantity of goods and services they consume, the resources used and the wastes generated to provide these goods and services. If all of humanity lived like an average Indonesian, for example, only two-thirds of the planet's biocapacity would be used; if everyone lived like an average Argentinean, humanity would demand more than half an additional planet; and if everyone lived like an average resident of the USA, a total of four Earths would be required to regenerate humanity's annual demand on nature.






Fuente: World Wildlife Fund (2012) Living Planet Report

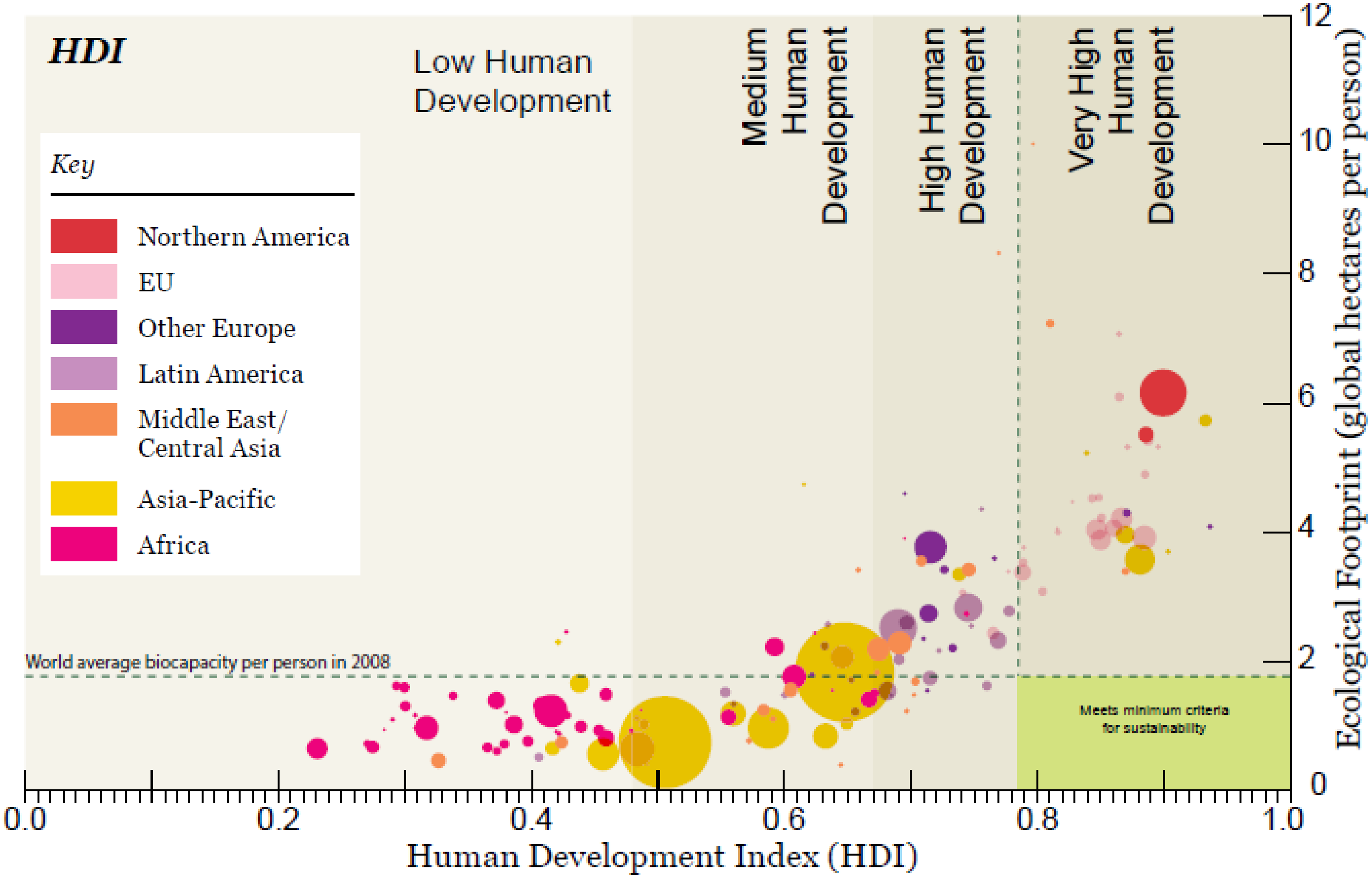



***Figure 39: The Ecological Footprint for each country versus the Human Development Index, 2008***
*The dot representing each country are coloured according to their geographic region and are scaled relative to its population The shading in the background of this figure and in figure 40 indicates the HDI thresholds for low, medium, high and very high human development and are based on UNDP, 2010 (Global Footprint Network, 2011).*



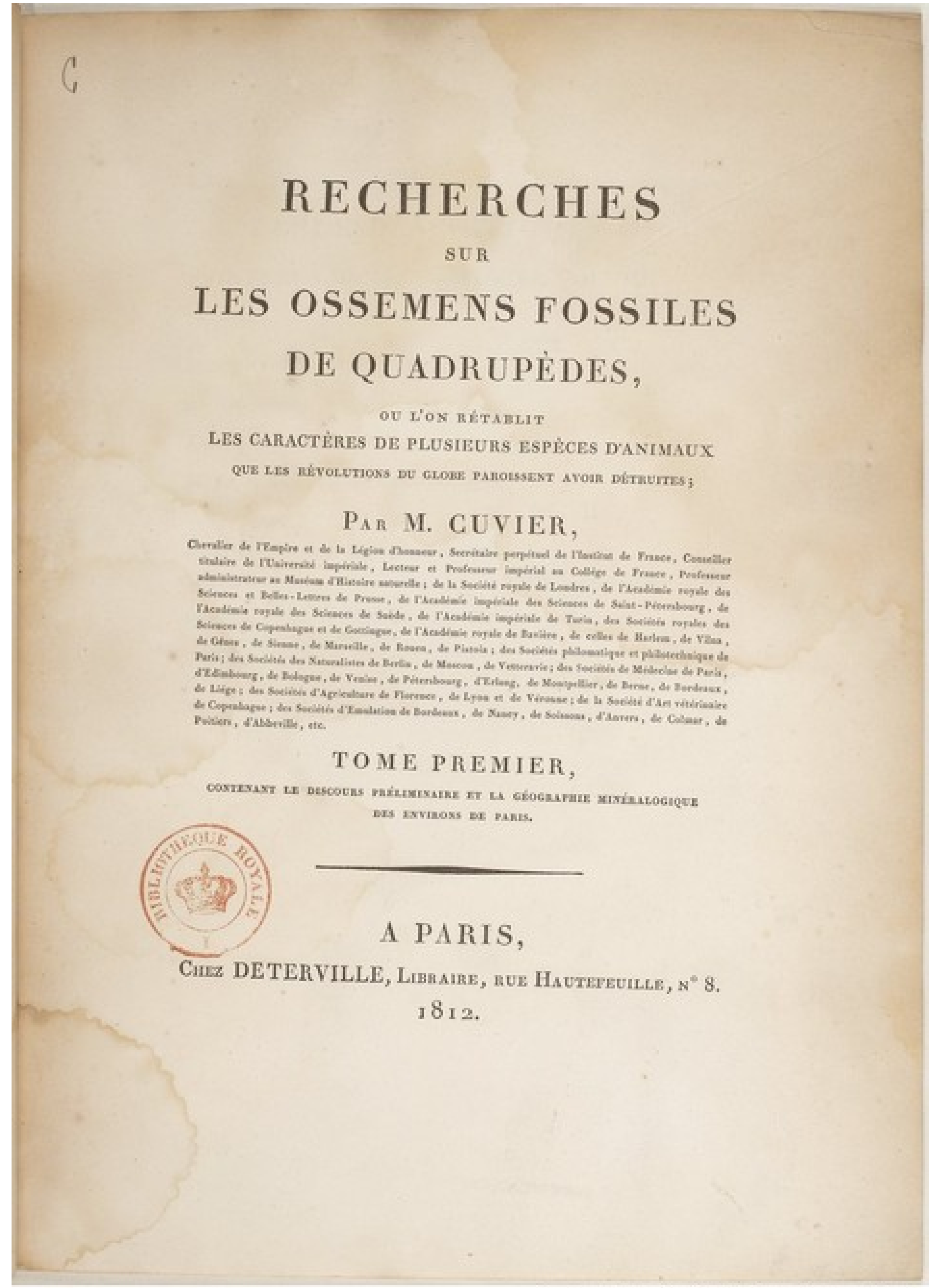
Fuente: World Wildlife Fund (2012) Living Planet Report


SEGUIMOS
CONSTRUYENDO
LA DESTRUCCIÓN
DEL FUTURO
ROGAMOS SEPAN
DISCULPAR MOLESTIAS
© QUINO

# Esquema de la charla

- Crecimiento de la población mundial y el antropoceno.
- La sexta extinción en masa.
- Qué es la biología de la conservación:
  - Historia
  - ¿Qué estudia la biología de la conservación en la actualidad?

Georges Cuvier (1769-1832)



C

RECHERCHES

SUR

LES OSSEMENS FOSSILES

DE QUADRUPÈDES,

OU L'ON RÉTABLIT

LES CARACTÈRES DE PLUSIEURS ESPÈCES D'ANIMAUX

QUE LES RÉVOLUTIONS DU GLOBE PAROISSENT AVOIR DÉTRUITES;

PAR M. CUVIER,

Chevalier de l'Empire et de la Légion d'honneur, Secrétaire perpétuel de l'Institut de France, Conseiller titulaire de l'Université impériale, Lecteur et Professeur impérial au Collège de France, Professeur administrateur au Muséum d'Histoire naturelle; de la Société royale de Londres, de l'Académie royale des Sciences et Belles-Lettres de Prusse, de l'Académie impériale des Sciences de Saint-Pétersbourg, de l'Académie royale des Sciences de Suède, de l'Académie impériale de Turin, des Sociétés royales des Sciences de Copenhague et de Gottingue, de l'Académie royale de Bavière, de celles de Harlem, de Vilna, de Gênes, de Sienne, de Marseille, de Rouen, de Pistoia; des Sociétés philomatique et philotechnique de Paris; des Sociétés des Naturalistes de Berlin, de Moscou, de Vetteravie; des Sociétés de Médecine de Paris, d'Edimbourg, de Bologne, de Venise, de Pétersbourg, d'Erlang, de Montpellier, de Berne, de Bordeaux, de Liége; des Sociétés d'Agriculture de Florence, de Lyon et de Véronne; de la Société d'Art vétérinaire de Copenhague; des Sociétés d'Emulation de Bordeaux, de Nancy, de Soissons, d'Anvers, de Colmar, de Poitiers, d'Abbeville, etc.

TOME PREMIER,

CONTENANT LE DISCOURS PRÉLIMINAIRE ET LA GÉOGRAPHIE MINÉRALOGIQUE DES ENVIRONS DE PARIS.

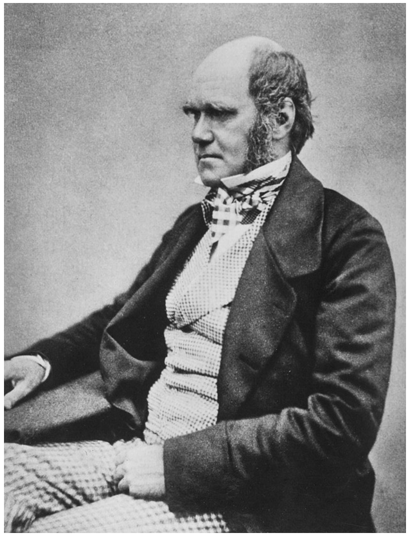


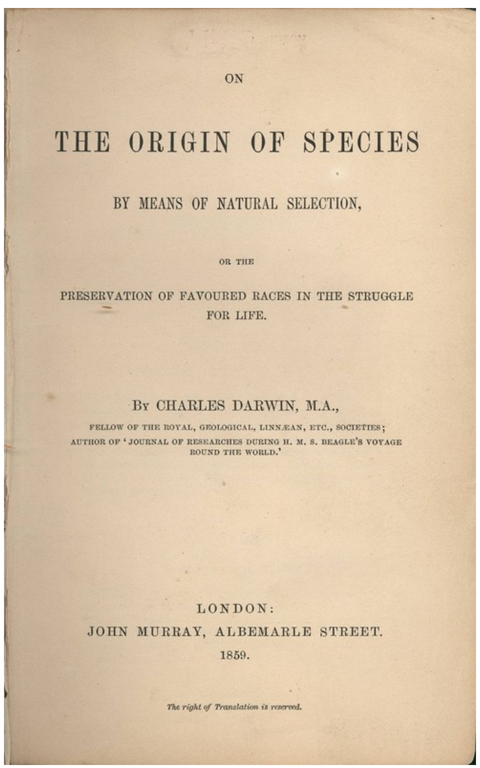
A PARIS,

CHEZ DETERVILLE, LIBRAIRE, RUE HAUTEFEUILLE, N° 8.

1812.


Mastodonte americano (*Mammut americanus*)





ON

THE ORIGIN OF SPECIES

BY MEANS OF NATURAL SELECTION,

OR THE

PRESERVATION OF FAVOURED RACES IN THE STRUGGLE FOR LIFE.

By CHARLES DARWIN, M.A.,

FELLOW OF THE ROYAL, GEOLOGICAL, LINNÆAN, ETC., SOCIETIES;
AUTHOR OF 'JOURNAL OF RESEARCHES DURING H. M. S. BEAGLE'S VOYAGE ROUND THE WORLD.'

LONDON:
JOHN MURRAY, ALBEMARLE STREET.
1859.

*The right of Translation is reserved.*

The theory of natural selection is grounded on the belief that each new variety, and ultimately each new species, is produced and maintained by having some advantage over those with which it comes into competition; and the consequent extinction of less favoured forms almost inevitably follows.

# Mass Extinctions in the Marine Fossil Record

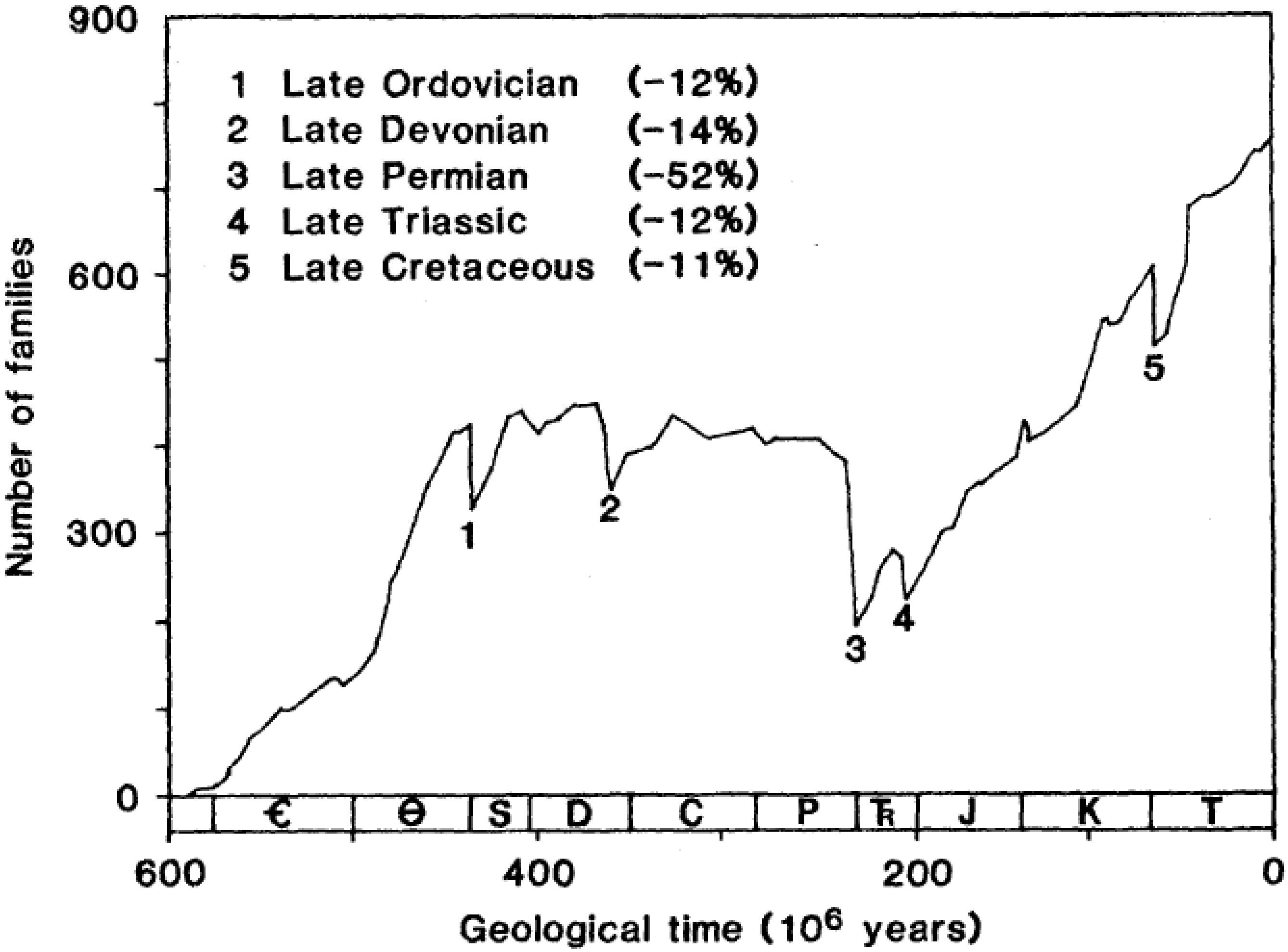



Fig. 2. Standing diversity through time for families of marine vertebrates and invertebrates. Rarely preserved groups are not included. Five mass extinctions, indicated by numerals, are recognizable by abrupt drops in the diversity curve. The relative magnitudes of these drops (measured from the stage before to the stage after the extinction event) are given in parentheses in the upper left. All mass extinctions but No. 2 (Devonian) are statistically significant in Fig. 1 and three (Nos. 1, 3, and 5) are highly significant ($P < .01$).

Fuente: Raup & Sepkoski (1982) Science 215: 1501-1503

# Has the Earth's sixth mass extinction already arrived?

Anthony D. Barnosky[1,2,3], Nicholas Matzke[1], Susumu Tomiya[1,2,3], Guinevere O. U. Wogan[1,3], Brian Swartz[1,2], Tiago B. Quental[1,2]†, Charles Marshall[1,2], Jenny L. McGuire[1,2,3]†, Emily L. Lindsey[1,2], Kaitlin C. Maguire[1,2], Ben Mersey[1,4] & Elizabeth A. Ferrer[1,2]

**Table 1 | The 'Big Five' mass extinction events**

| Event | Proposed causes |
|---|---|
| The Ordovician event[64–66] ended ~443 Myr ago; within 3.3 to 1.9 Myr 57% of genera were lost, an estimated 86% of species. | Onset of alternating glacial and interglacial episodes; repeated marine transgressions and regressions. Uplift and weathering of the Appalachians affecting atmospheric and ocean chemistry. Sequestration of $CO_2$. |
| The Devonian event[4,64,67–70] ended ~359 Myr ago; within 29 to 2 Myr 35% of genera were lost, an estimated 75% of species. | Global cooling (followed by global warming), possibly tied to the diversification of land plants, with associated weathering, paedogenesis, and the drawdown of global $CO_2$. Evidence for widespread deep-water anoxia and the spread of anoxic waters by transgressions. Timing and importance of bolide impacts still debated. |
| The Permian event[54,71–73] ended ~251 Myr ago; within 2.8 Myr to 160 Kyr 56% of genera were lost, an estimated 96% of species. | Siberian volcanism. Global warming. Spread of deep marine anoxic waters. Elevated $H_2S$ and $CO_2$ concentrations in both marine and terrestrial realms. Ocean acidification. Evidence for a bolide impact still debated. |
| The Triassic event[74,75] ended ~200 Myr ago; within 8.3 Myr to 600 Kyr 47% of genera were lost, an estimated 80% of species. | Activity in the Central Atlantic Magmatic Province (CAMP) thought to have elevated atmospheric $CO_2$ levels, which increased global temperatures and led to a calcification crisis in the world oceans. |
| The Cretaceous event[58–60,76–79] ended ~65 Myr ago; within 2.5 Myr to less than a year 40% of genera were lost, an estimated 76% of species. | A bolide impact in the Yucatán is thought to have led to a global cataclysm and caused rapid cooling. Preceding the impact, biota may have been declining owing to a variety of causes: Deccan volcanism contemporaneous with global warming; tectonic uplift altering biogeography and accelerating erosion, potentially contributing to ocean eutrophication and anoxic episodes. $CO_2$ spike just before extinction, drop during extinction. |

Myr, million years. Kyr, thousand years.

Fuente: Barnoski et al. (2011) Nature 471: 51-57

# Has the Earth's sixth mass extinction already arrived?

Anthony D. Barnosky[1,2,3], Nicholas Matzke[1], Susumu Tomiya[1,2,3], Guinevere O. U. Wogan[1,3], Brian Swartz[1,2], Tiago B. Quental[1,2]†, Charles Marshall[1,2], Jenny L. McGuire[1,2,3]†, Emily L. Lindsey[1,2], Kaitlin C. Maguire[1,2], Ben Mersey[1,4] & Elizabeth A. Ferrer[1,2]

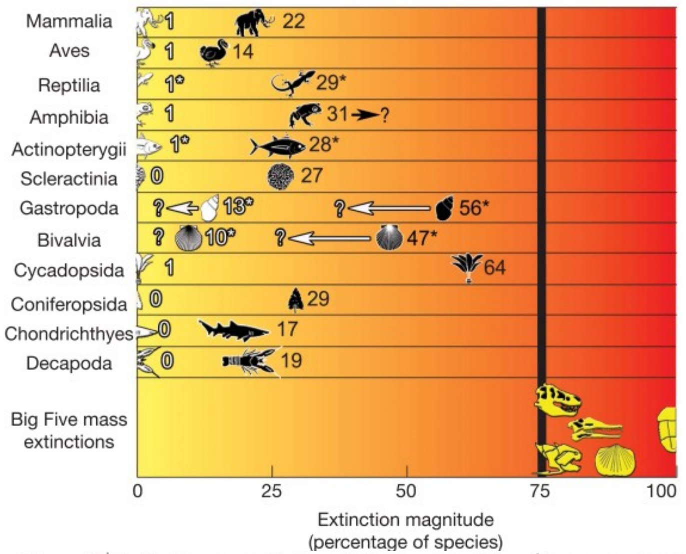



**Figure 2 | Extinction magnitudes of IUCN-assessed taxa[6] in comparison to the 75% mass-extinction benchmark.** Numbers next to each icon indicate percentage of species. White icons indicate species 'extinct' and 'extinct in the wild' over the past 500 years. Black icons add currently 'threatened' species to those already 'extinct' or 'extinct in the wild'; the amphibian percentage may be as high as 43% (ref. 19). Yellow icons indicate the Big Five species losses: Cretaceous + Devonian, Triassic, Ordovician and Permian (from left to right). Asterisks indicate taxa for which very few species (less than 3% for gastropods and bivalves) have been assessed; white arrows show where extinction percentages are probably inflated (because species perceived to be in peril are often assessed first). The number of species known or assessed for each of the groups listed is: Mammalia 5,490/5,490; Aves (birds) 10,027/10,027; Reptilia 8,855/1,677; Amphibia 6,285/6,285, Actinopterygii 24,000/5,826, Scleractinia (corals) 837/837; Gastropoda 85,000/2,319; Bivalvia 30,000/310, Cycadopsida 307/307; Coniferopsida 618/618; Chondrichthyes 1,044/1,044; and Decapoda 1,867/1,867.

The second point is particularly important. Even taking into account the difficulties of comparing the fossil and modern records, and applying conservative comparative methods that favour minimizing the differences between fossil and modern extinction metrics, there are clear indications that losing species now in the 'critically endangered' category would propel the world to a state of mass extinction that has previously been seen only five times in about 540 million years. Additional losses of species in the 'endangered' and 'vulnerable' categories could accomplish the sixth mass extinction in just a few centuries. It may be of particular concern that this extinction trajectory would play out under conditions that resemble the 'perfect storm' that coincided with past mass extinctions: multiple, atypical high-intensity ecological stressors, including rapid, unusual climate change and highly elevated atmospheric $CO_2$.

Fuente: Barnoski et al. (2011) Nature 471: 51-57

# Accelerated modern human–induced species losses: Entering the sixth mass extinction

**Gerardo Ceballos,[1]* Paul R. Ehrlich,[2] Anthony D. Barnosky,[3] Andrés García,[4] Robert M. Pringle,[5] Todd M. Palmer[6]**

**The oft-repeated claim that Earth's biota is entering a sixth "mass extinction" depends on clearly demonstrating that current extinction rates are far above the "background" rates prevailing between the five previous mass extinctions. Earlier estimates of extinction rates have been criticized for using assumptions that might overestimate the severity of the extinction crisis. We assess, using extremely conservative assumptions, whether human activities are causing a mass extinction. First, we use a recent estimate of a background rate of 2 mammal extinctions per 10,000 species per 100 years (that is, 2 E/MSY), which is twice as high as widely used previous estimates. We then compare this rate with the current rate of mammal and vertebrate extinctions. The latter is conservatively low because listing a species as extinct requires meeting stringent criteria. Even under our assumptions, which would tend to minimize evidence of an incipient mass extinction, the average rate of vertebrate species loss over the last century is up to 100 times higher than the background rate. Under the 2 E/MSY background rate, the number of species that have gone extinct in the last century would have taken, depending on the vertebrate taxon, between 800 and 10,000 years to disappear. These estimates reveal an exceptionally rapid loss of biodiversity over the last few centuries, indicating that a sixth mass extinction is already under way. Averting a dramatic decay of biodiversity and the subsequent loss of ecosystem services is still possible through intensified conservation efforts, but that window of opportunity is rapidly closing.**

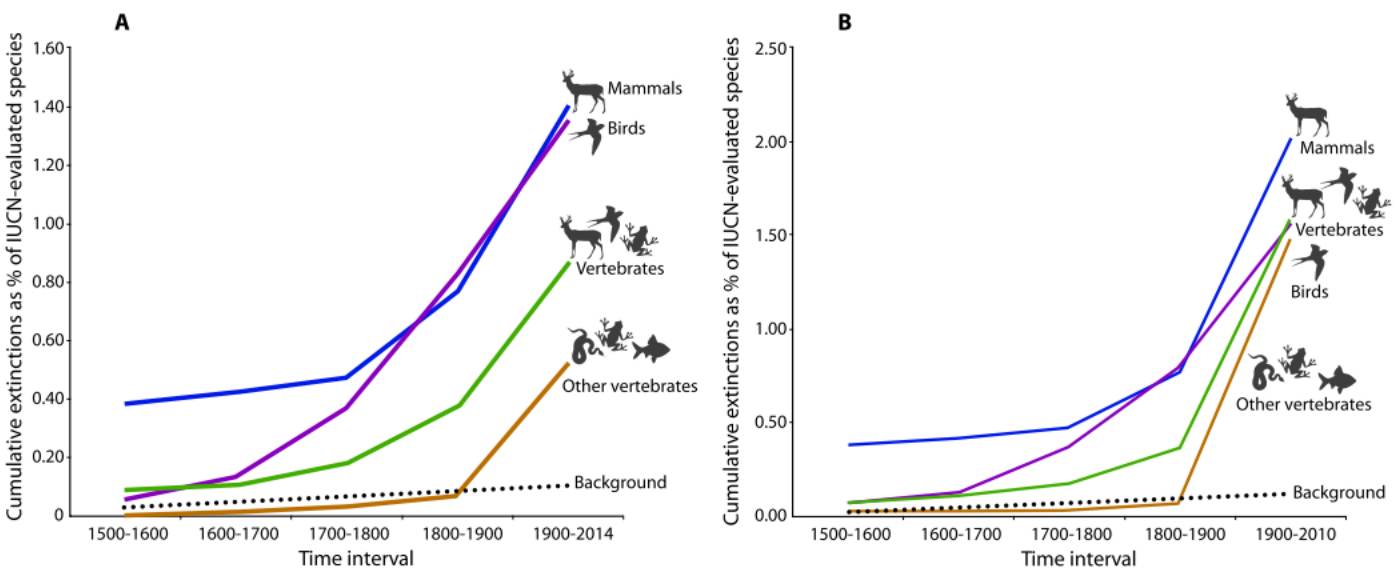



**Fig. 1. Cumulative vertebrate species recorded as extinct or extinct in the wild by the IUCN (2012).** Graphs show the percentage of the number of species evaluated among mammals (5513; 100% of those described), birds (10,425; 100%), reptiles (4414; 44%), amphibians (6414; 88%), fishes (12,457; 38%), and all vertebrates combined (39,223; 59%). Dashed black curve represents the number of extinctions expected under a constant standard background rate of 2 E/MSY. (**A**) Highly conservative estimate. (**B**) Conservative estimate.



Fuente: Ceballos et al. (2015) Science Advances 1: e1400253

# Ecological selectivity of the emerging mass extinction in the oceans

Jonathan L. Payne,[1*] Andrew M. Bush,[2] Noel A. Heim,[1]
Matthew L. Knope,[3] Douglas J. McCauley[4]

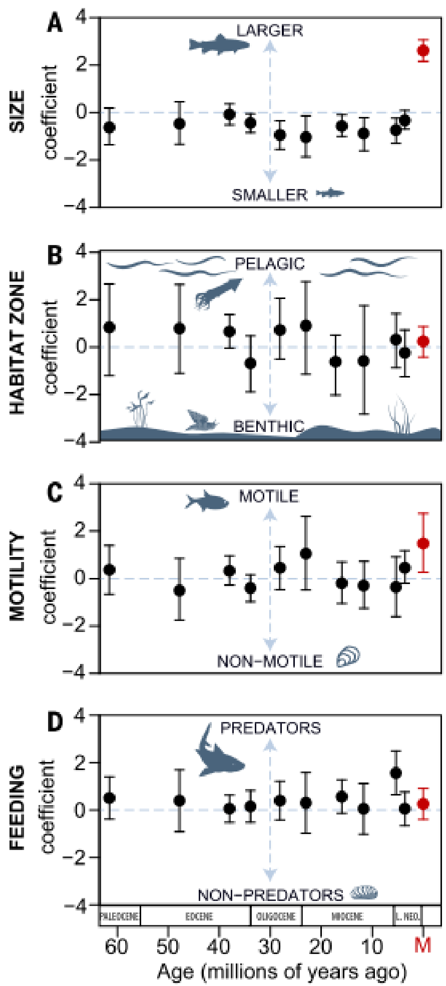



**Fig. 2. Extinction threat in modern oceans is uniquely biased against larger-bodied animals.** Ecological selectivity of extinction risk in the modern oceans (red symbols) and background extinction selectivity in the Cenozoic Era (66 Ma to present) based on the fossil record (black symbols). The vertical axis represents the coefficient associated with the predictor averaged across all subsets of the full multiple regression model. Error bars represent 95% confidence intervals on estimated coefficients.

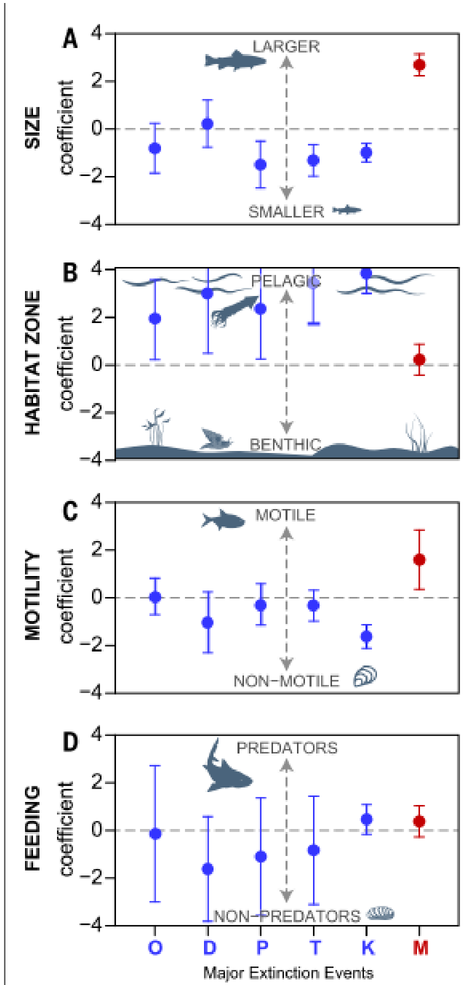
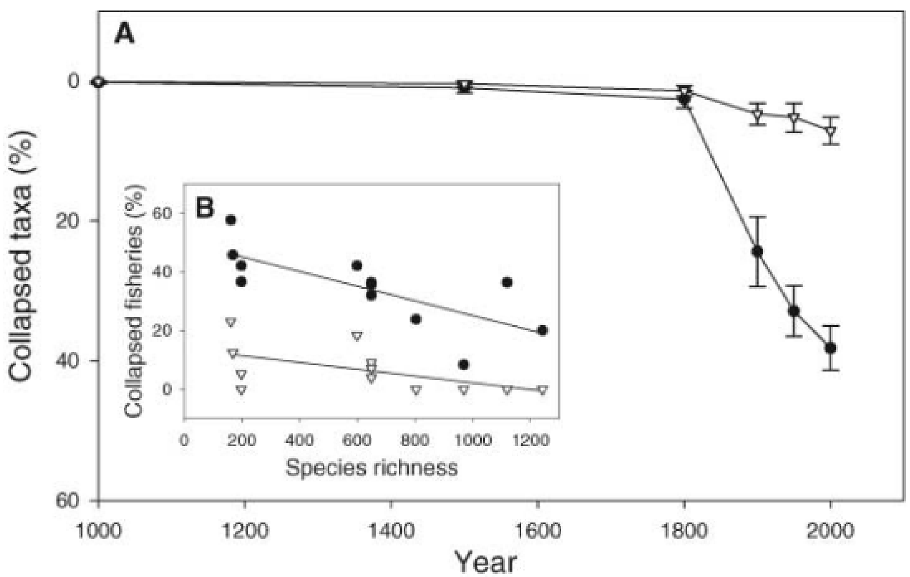


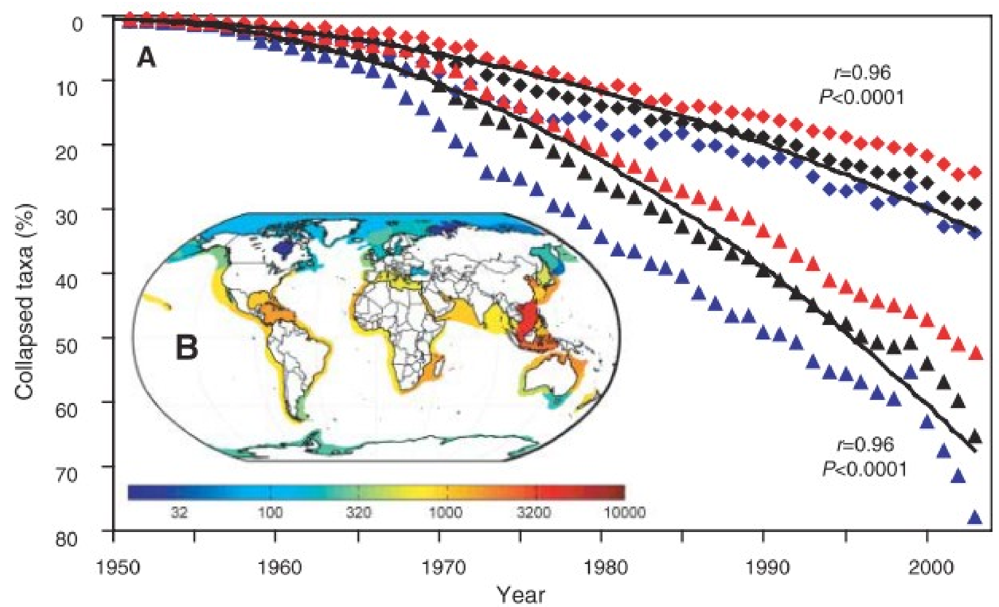

**Fig. 3. Ecological selectivity of extinction threat in the modern oceans is unlike any previous mass extinction.** Previous mass extinction events (blue symbols) preferentially eliminated pelagic genera and, sometimes, smaller genera, whereas the modern extinction threat (red symbols) is strongly associated with larger body size and moderately associated with motility. Error bars represent 95% confidence intervals on estimated coefficients. O, Late Ordovician; D, Late Devonian (Frasnian/Famennian); P, end-Permian; T, end-Triassic; K, end-Cretaceous; M, modern extinction threat.

Fuente:
Payne et al. (2016) Science 353: 1284-1286

# Impacts of Biodiversity Loss on Ocean Ecosystem Services

Boris Worm,[1*] Edward B. Barbier,[2] Nicola Beaumont,[3] J. Emmett Duffy,[4] Carl Folke,[5,6] Benjamin S. Halpern,[7] Jeremy B. C. Jackson,[8,9] Heike K. Lotze,[1] Fiorenza Micheli,[10] Stephen R. Palumbi,[10] Enric Sala,[8] Kimberley A. Selkoe,[7] John J. Stachowicz,[11] Reg Watson[12]




Fuente:
Worm et al. (2006) Science 314: 787-790

# Impending extinction crisis of the world's primates: Why primates matter

Alejandro Estrada,[1]* Paul A. Garber,[2]* Anthony B. Rylands,[3] Christian Roos,[4] Eduardo Fernandez-Duque,[5] Anthony Di Fiore,[6] K. Anne-Isola Nekaris,[7] Vincent Nijman,[7] Eckhard W. Heymann,[8] Joanna E. Lambert,[9] Francesco Rovero,[10] Claudia Barelli,[10] Joanna M. Setchell,[11] Thomas R. Gillespie,[12] Russell A. Mittermeier,[3] Luis Verde Arregoitia,[13] Miguel de Guinea,[7] Sidney Gouveia,[14] Ricardo Dobrovolski,[15] Sam Shanee,[16,17] Noga Shanee,[16,17] Sarah A. Boyle,[18] Agustin Fuentes,[19] Katherine C. MacKinnon,[20] Katherine R. Amato,[21] Andreas L. S. Meyer,[22] Serge Wich,[23,24] Robert W. Sussman,[25] Ruliang Pan,[26] Inza Kone,[27] Baoguo Li[28]

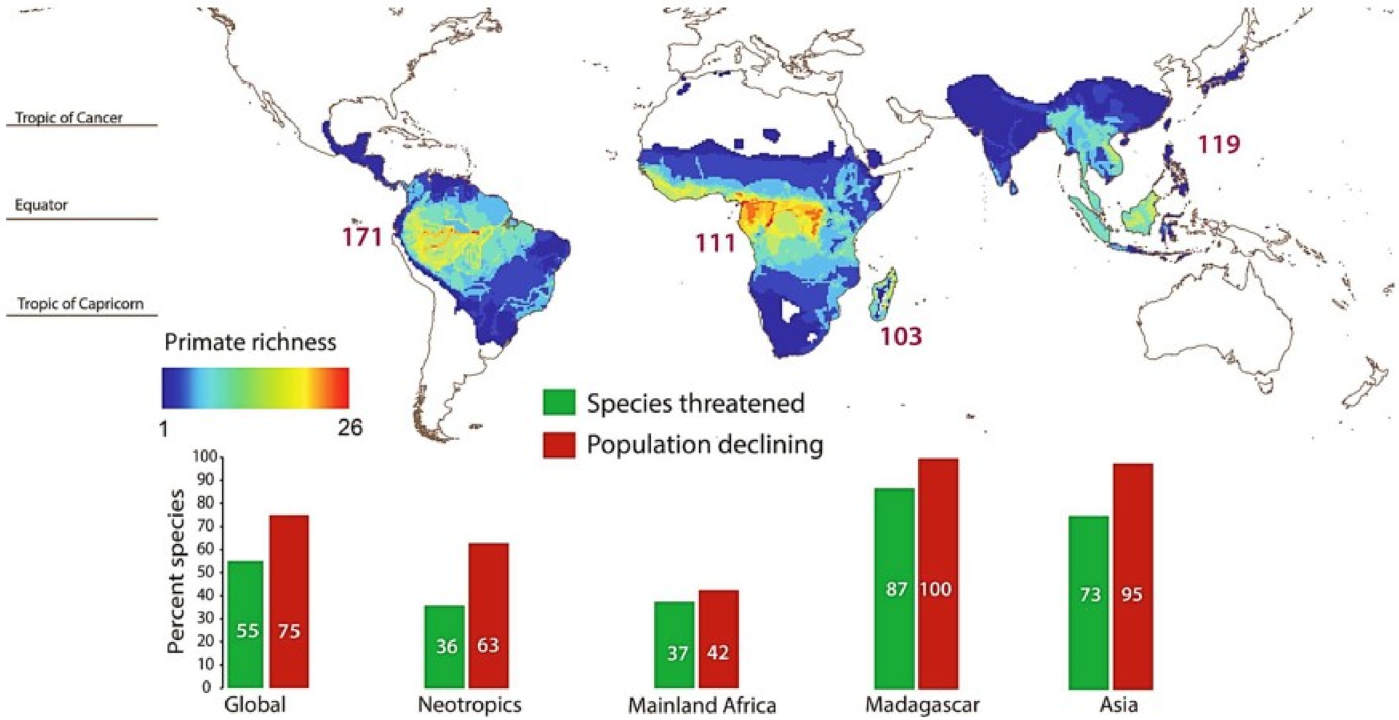



**Fig. 1. Global primate species richness, distributions, and the percentage of species threatened and with declining populations.** Geographic distribution of primate species. Numbers in red by each region refer to the number of extant species present. The bars at the bottom show the percent of species threatened with extinction and the percent of species with declining populations in each region. Percentage of threatened species and percentage of species with declining populations in each region from tables S1 to S4. Geographical range data of living, native species from the IUCN Red List (www.iucnredlist.org) are overlaid onto a 0.5° resolution equal-area grid. In cases in which a species' range was split into multiple subspecies, these were merged to create a range map for the species. Mainland Africa includes small associated islands.

Fuente:
Estrada et al. (2017) Science Advances 3: e1600946

# Extinction risk is most acute for the world's largest and smallest vertebrates

William J. Ripple[a,1,2], Christopher Wolf[a,1], Thomas M. Newsome[a,b,c,d], Michael Hoffmann[e,f], Aaron J. Wirsing[d], and Douglas J. McCauley[g]

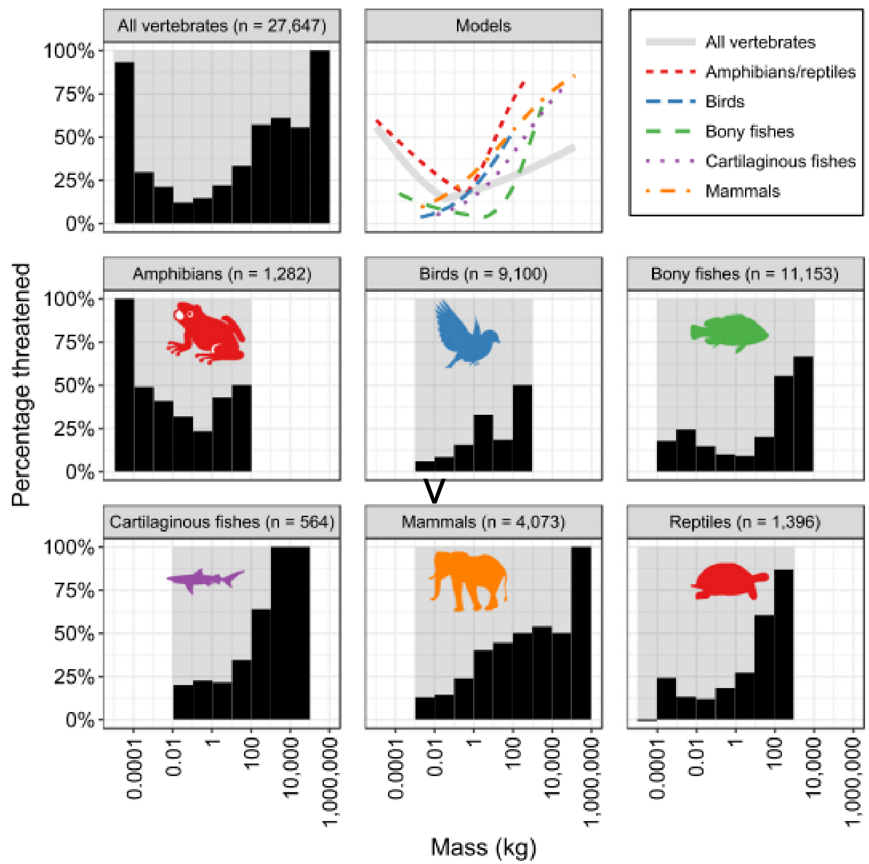



**Fig. 1.** Relationships between vertebrate body mass and percentage of species threatened (black histograms) and between mass and probability of being threatened ("Models" graph). Lines in the Models graph indicate the predicted probabilities of being threatened as a function of body mass based on logistic regression models with taxonomic random effects to account for phylogenetic dependence. Segmented models were fitted for all vertebrates, amphibians/reptiles, and bony fishes as these taxa have different (bimodal) body mass–extinction risk relationships at low and high body masses.

Fuente: Ripple et al. (2017) PNAS

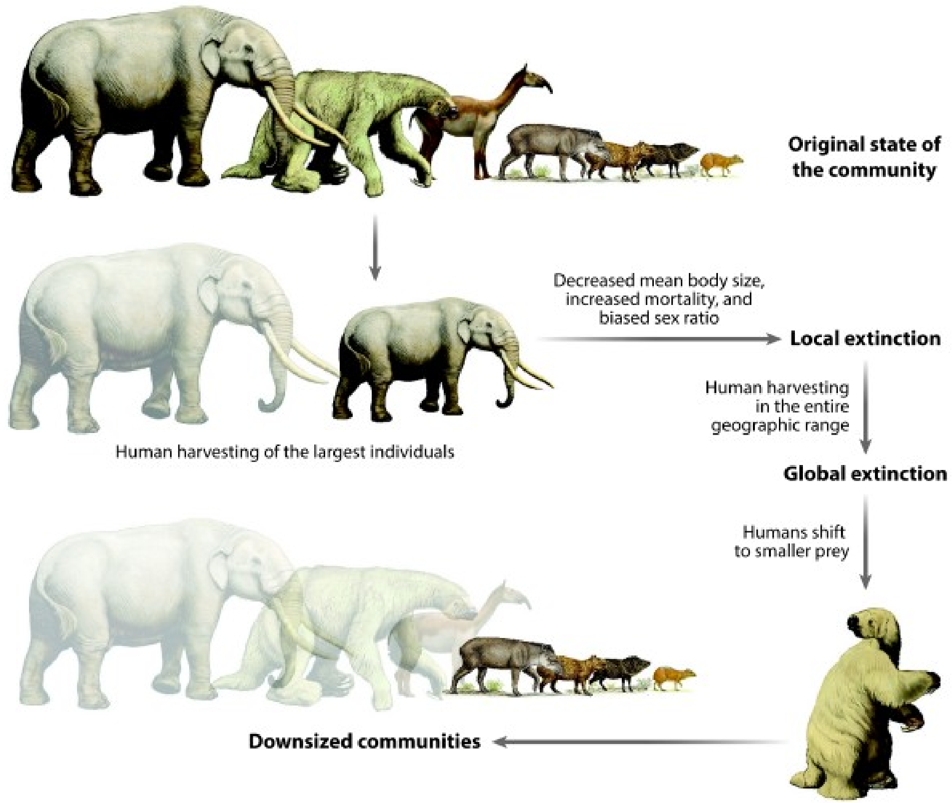



**Figure 3**

Disproportionate impacts of human harvesting the largest individuals and the largest species in a community first. Such harvesting causes local declines in abundance of the largest individuals, inducing population-scale downsizing and many population-scale impacts. This decline often proceeds to local extinction of populations of large-sized species. Replicated across regions, this local extinction often progresses to global extinction, such that large body size is a leading predictor of global extinction risk. Megafauna images copyright and courtesy of Fiona A. Reid.

Fuente: Young et al. (2016) Ann. Rev. Ecol., Evol. & Syst. 47: 333-358

## Extinction and the Loss of Evolutionary History

Sean Nee* and Robert M. May

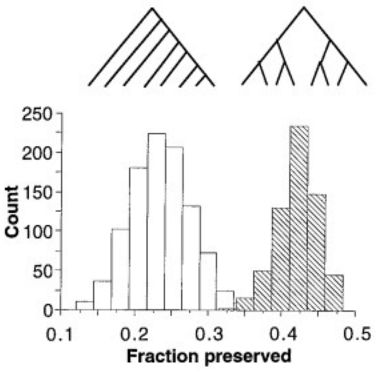
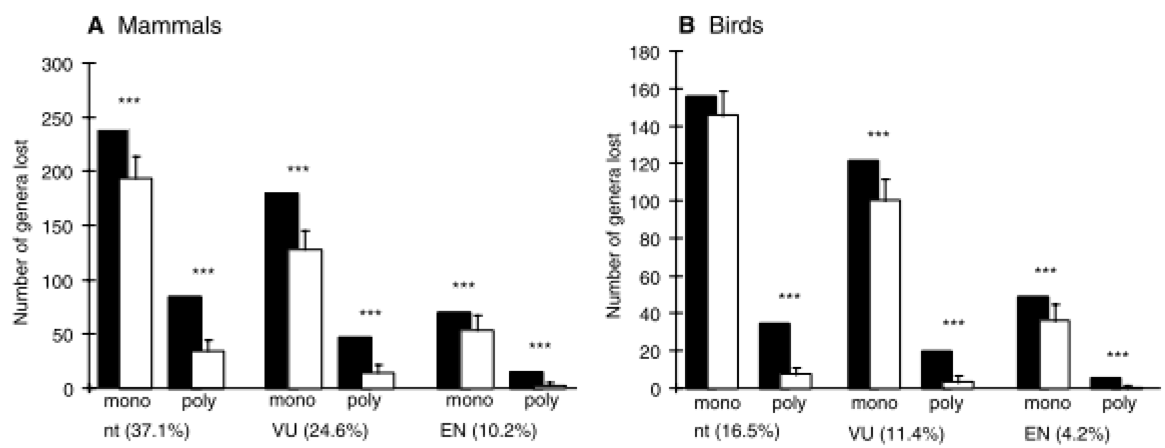



**Fig. 3.** Histograms of the fraction of evolutionary history saved by random samples of 12 species from a comb topology (left) and a bush topology (right) containing a total of 64 species. In the simulation study the times between nodes are the same for both topologies: the time between the *i*th and $(i + 1)$ node is $1/(i + 1)$, that is, the expected time interval under a pure birth process.

## Nonrandom Extinction and the Loss of Evolutionary History

Andy Purvis,[1]* Paul-Michael Agapow,[1] John L. Gittleman,[2] Georgina M. Mace[3]

**Fig. 1.** Numbers of monotypic and polytypic genera lost under different extinction regimes for (**A**) mammals and (**B**) birds. Dark bars: extinction of all species listed at or above the indicated threshold level of threat [see note (*12*); numbers in parentheses are percentages of species culled]. Light bars: random extinction of same intensity (mean of 1000 trials). Error bars: 2 standard deviations of the simulation distribution. ***$P \leq 0.001$ (*P* values obtained directly from distribution of simulation results). For overall genus loss (monotypic + polytypic), all $P \leq 0.001$. DD species were treated as being at no risk of extinction; treating them as EN led to qualitatively very similar results (*33*).

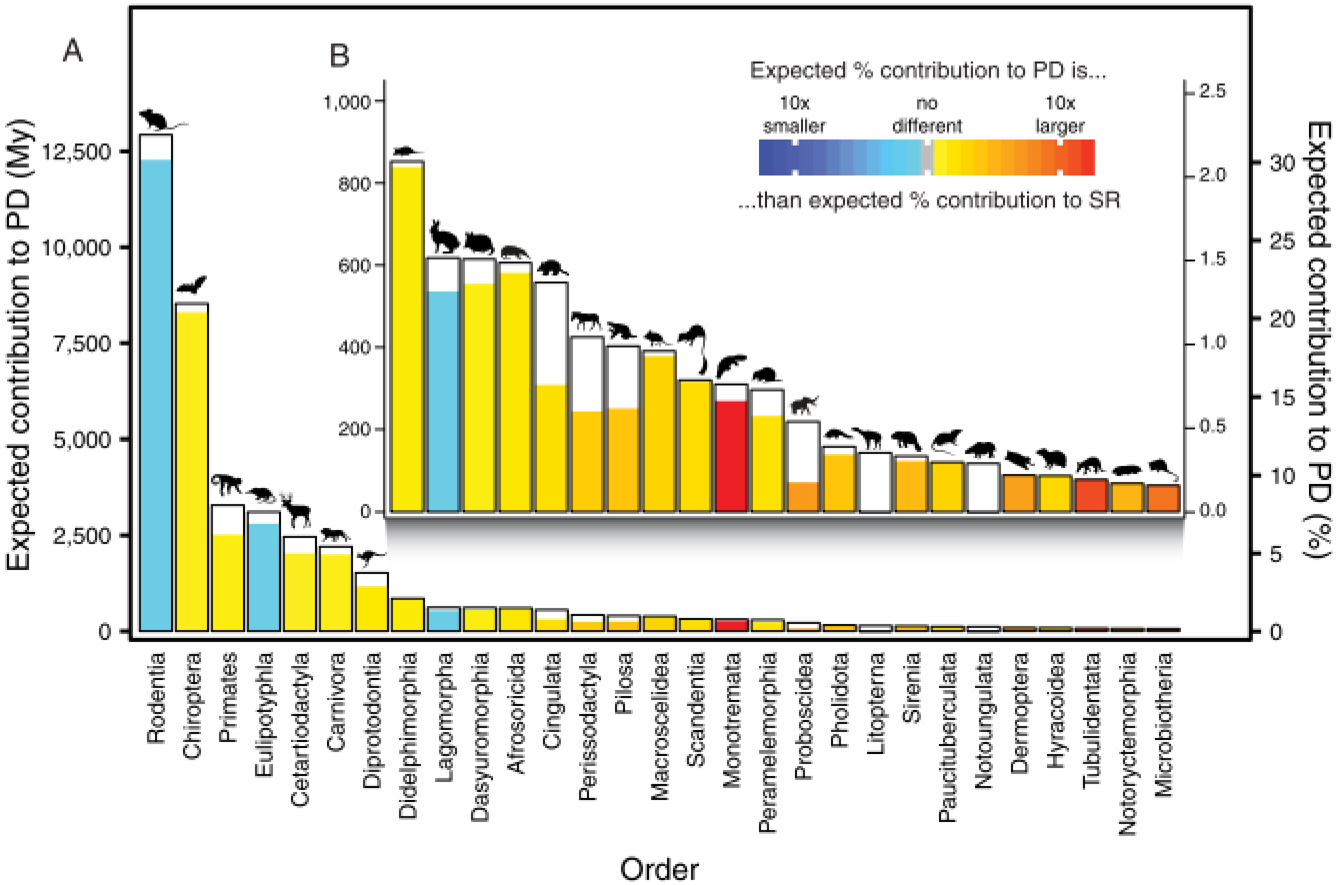





Fuente: Nee & May (1997) Science 278: 692-694; Purvis et al. (2000) Science 288: 328-330

# Mammal diversity will take millions of years to recover from the current biodiversity crisis

Matt Davis[a,b,1], Søren Faurby[c,d], and Jens-Christian Svenning[a,b]



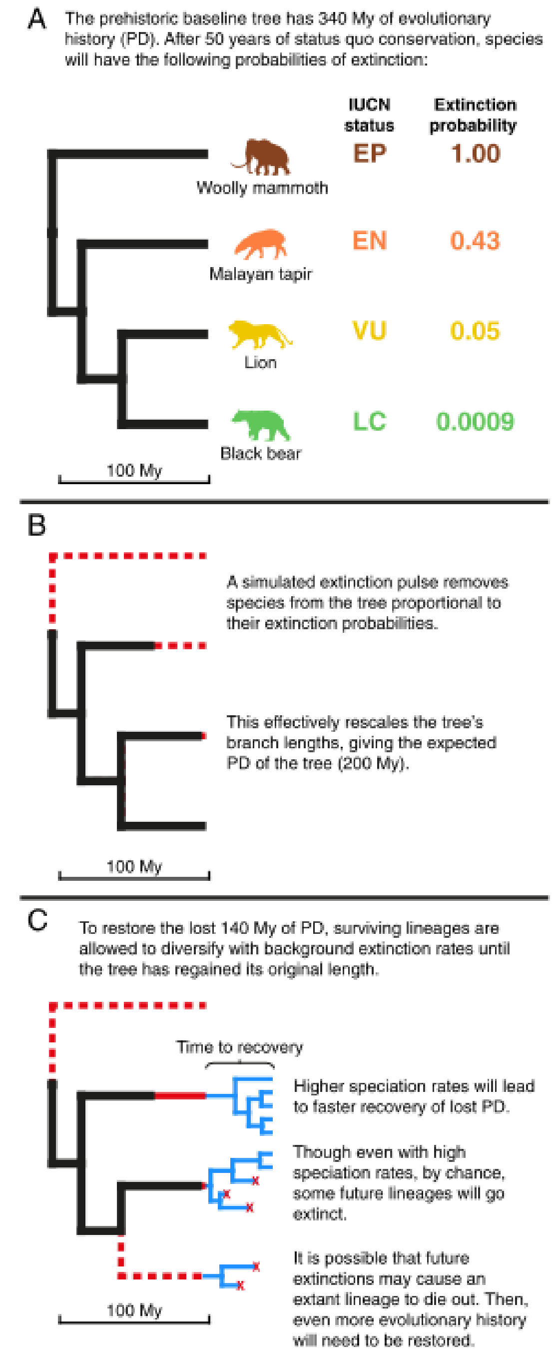
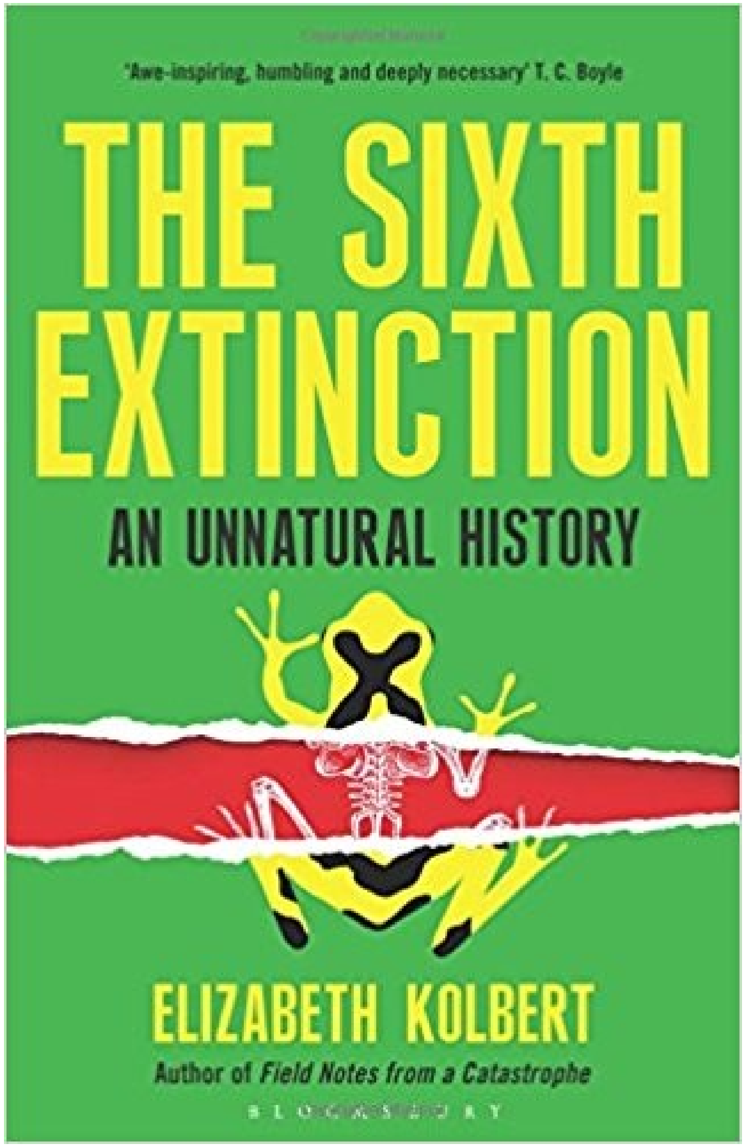




**Fig. 3.** Diagrammatic explanation of how we modeled the loss and recovery of PD. The total PD of a prehistoric tree containing all mammals is used as a preanthropogenic baseline before (*A*) a simulated extinction pulse removes species from the tree proportional to their probability of extinction (*B*). IUCN status abbreviations: EN, endangered; EP, extinct in prehistory (a status added here); LC, least concern; VU, vulnerable. (*C*) After the extinction pulse, lineages are allowed to diversify at background extinction rates until they have generated enough new branch lengths to restore lost PD (red branches).

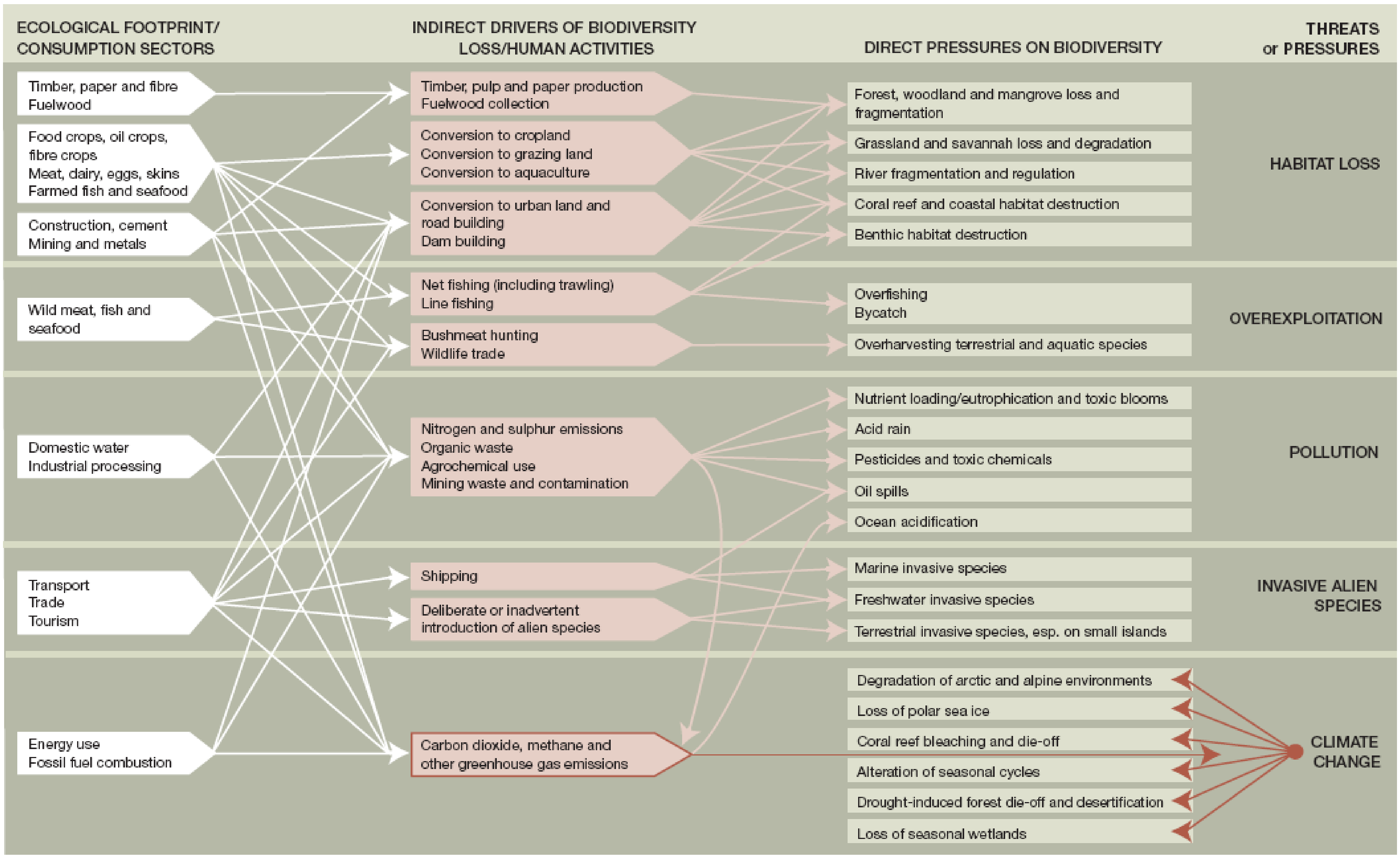
Fuente: Davis et al. (2018) PNAS

Kauaʻi ʻōʻō (*Moho braccatus*), miembro del género extinto *Moho* de la familia extinta Mohoidae de las islas de Hawai'i. Fuente: Wikipedia.


'Awe-inspiring, humbling and deeply necessary' T. C. Boyle
THE SIXTH EXTINCTION
AN UNNATURAL HISTORY
ELIZABETH KOLBERT
Author of Field Notes from a Catastrophe
BLOOMSBURY

# Amenazas a la biodiversidad

Fig. 4: **BIODIVERSITY LOSS, HUMAN PRESSURE AND THE ECOLOGICAL FOOTPRINT,** cause-and-effect relationships






Fuente: World Wildlife Fund (2008) Living Planet Report

# Amenazas a la biodiversidad

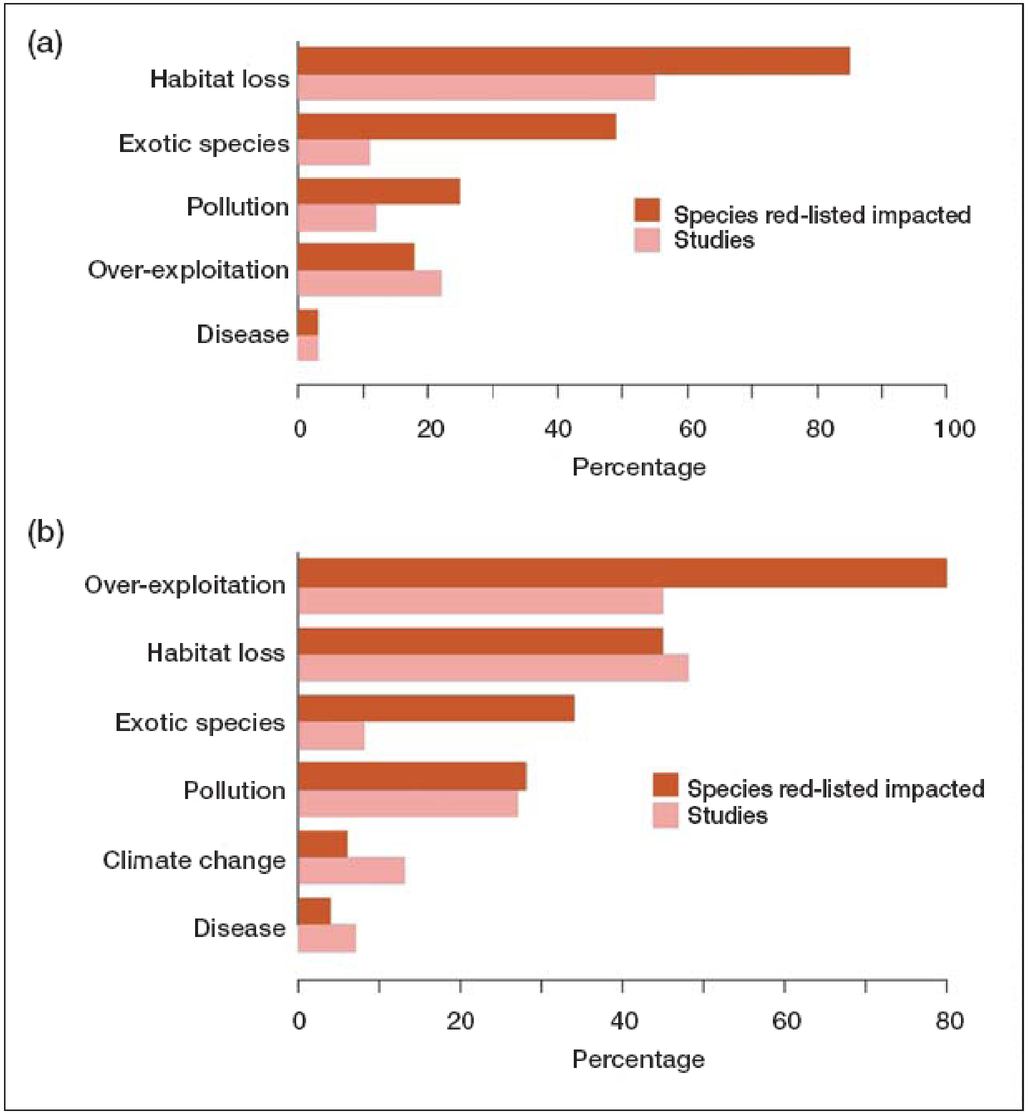



**Figure 5.** *A comparison of the prevalence of different risks to biodiversity and the degree to which they are reported in the literature, (a) in all systems and (b) in marine systems. The prevalence of threats to species in all systems was derived from Wilcove* et al. *(1998). The prevalence of threats to marine systems was taken from Kappel (2005).*



Fuente: Lawler et al. (2006) Front. Ecol. Environ. 4: 473-480

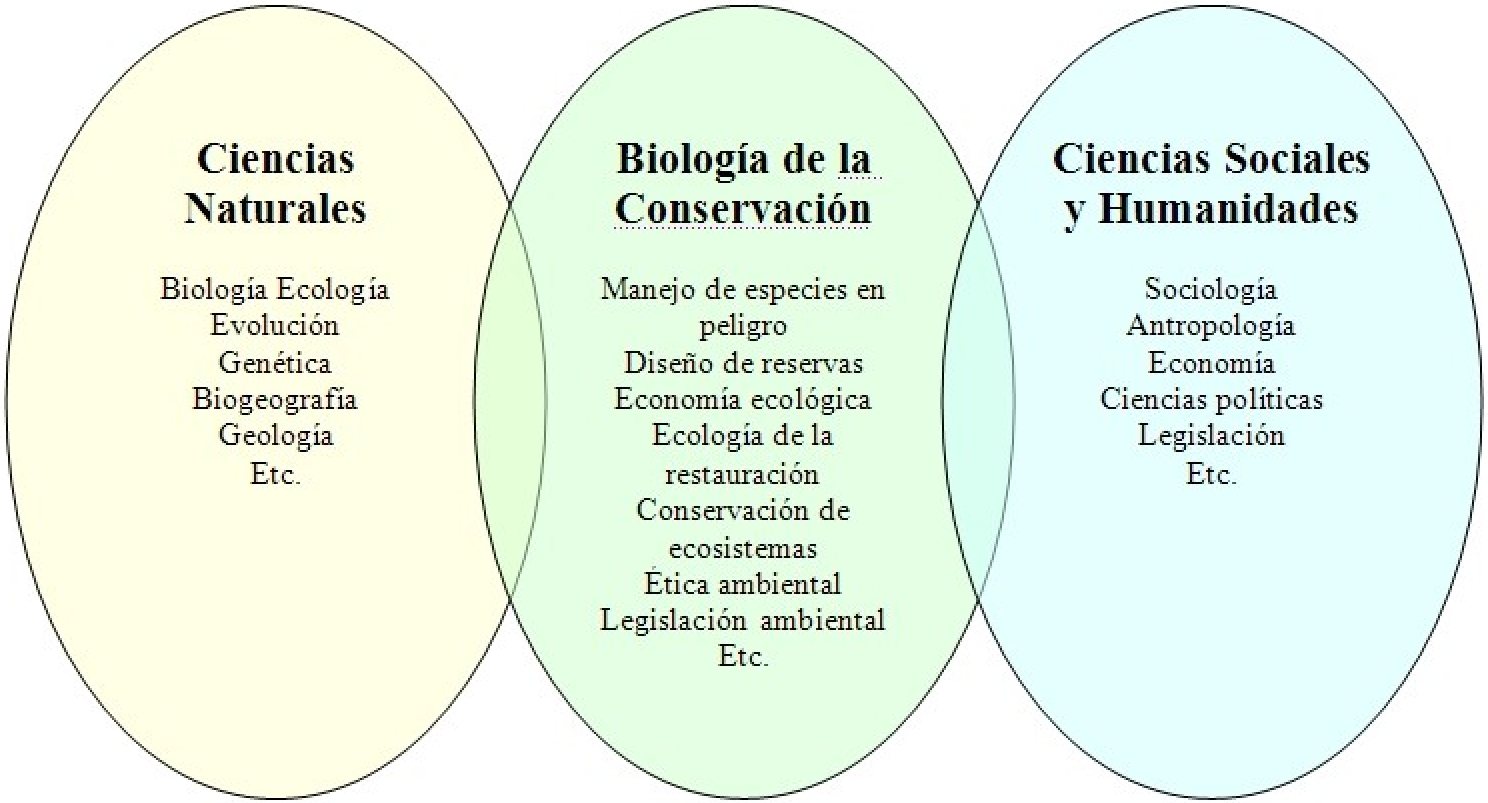
# Esquema de la charla

- Crecimiento de la población mundial y el antropoceno.
- La sexta extinción en masa.
- Qué es la biología de la conservación:
  - Historia
  - ¿Qué estudia la biología de la conservación en la actualidad?

# ¿Qué es la biología de la conservación?

- Disciplina científica de síntesis de reciente aparición.
- Se ocupa de estudiar las causas de la pérdida de diversidad biológica en todos sus niveles (genética, individual, específica, ecosistémica) y de cómo minimizar esta pérdida.
- Integra contribuciones de diversas disciplinas como la ecología, la genética, la biogeografía, la biología del comportamiento, las ciencias políticas, la sociología y la antropología.

# ¿Qué es la biología de la conservación?




La biología de la conservación integra disciplinas de los campos de las ciencias naturales, las ciencias sociales y las humanidades (Modificado a partir de Groom *et al*., 2006)

# La biología de la conservación es sintética y multidisciplinaria

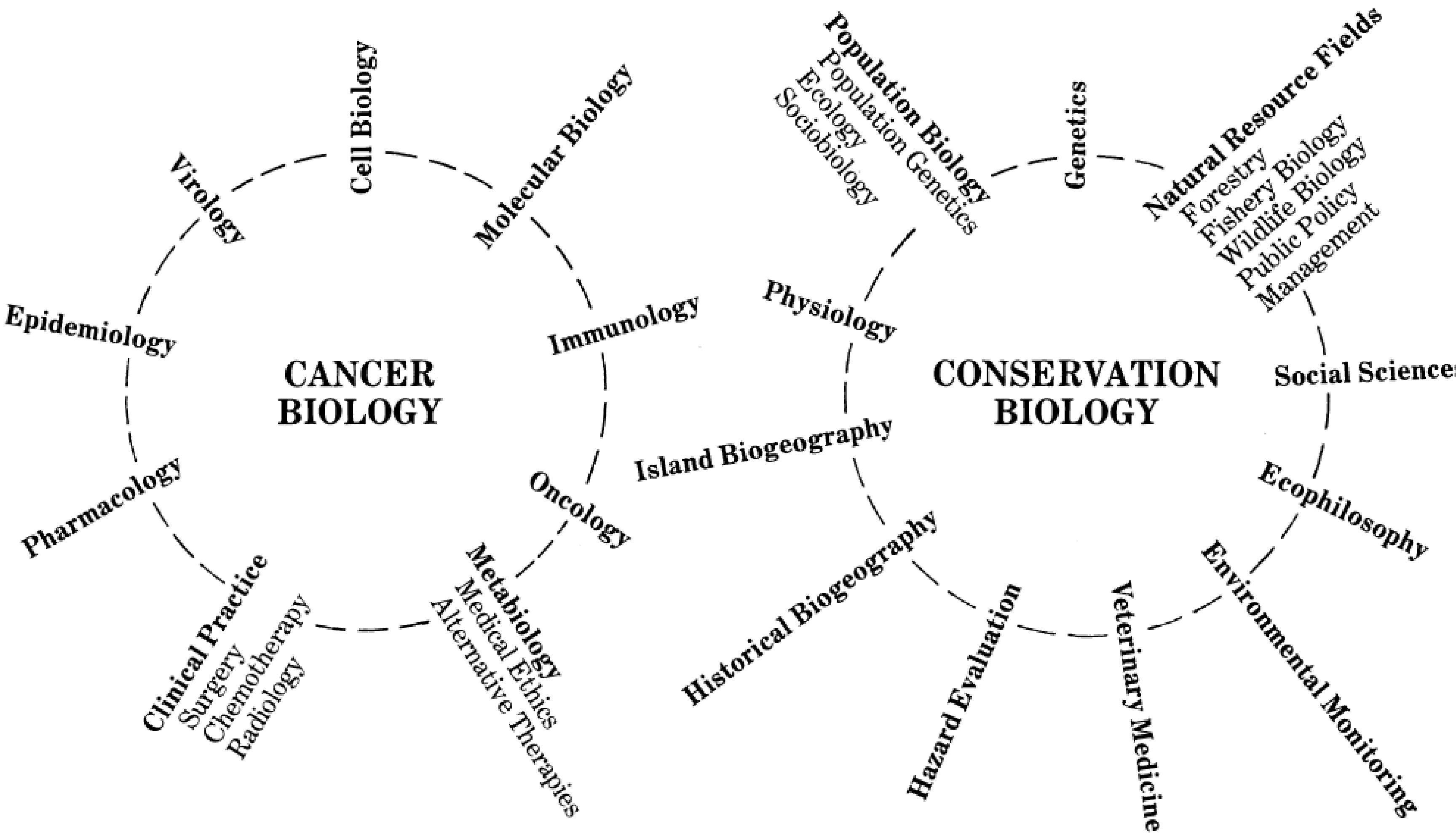



**Figure 1.** Cancer biology and conservation biology are both synthetic, multidisciplinary sciences. The dashed line indicates the artificial nature of the borders between disciplines and between "basic" and "applied" research. See text.



Fuente: Soulé (1985) BioScience 35: 727-734

# Principios fundamentales de la biología de la conservación

- La evolución es el axioma básico que une toda la biología.
- El mundo ecológico es dinámico y está mayoritariamente fuera de equilibrio.
- La presencia humana debe ser incluida en la planificación de la conservación.

Fuente: Groom et al. (2006) Principles of Conservation Biology, Sinauer

# La biología de la conservación hoy

**Table 1. Journals included in the literature survey for each of 3 years**

| *1984* | *1994* | *2004* |
|---|---|---|
| *Biological Conservation* | *Biological Conservation* | *Agriculture, Ecosystems and the Environment* |
| *Journal of Applied Ecology* | *Conservation Biology* | *Animal Conservation* |
| | *Ecological Applications* | *Austral Ecology* |
| | *Ecological Economics* | *Biodiversity and Conservation* |
| | *Journal of Applied Ecology* | *Biological Conservation* |
| | | *Conservation Biology* |
| | | *Ecological Applications* |
| | | *Ecological Economics* |
| | | *Ecology Letters* |
| | | *Ecosystems* |
| | | *Ecotoxicology* |
| | | *Global Change Biology* |
| | | *Journal of Applied Ecology* |
| | | *Oryx* |



Fuente: Lawler et al. (2006) Front. Ecol. Environ. 4: 473-480

# La biología de la conservación hoy

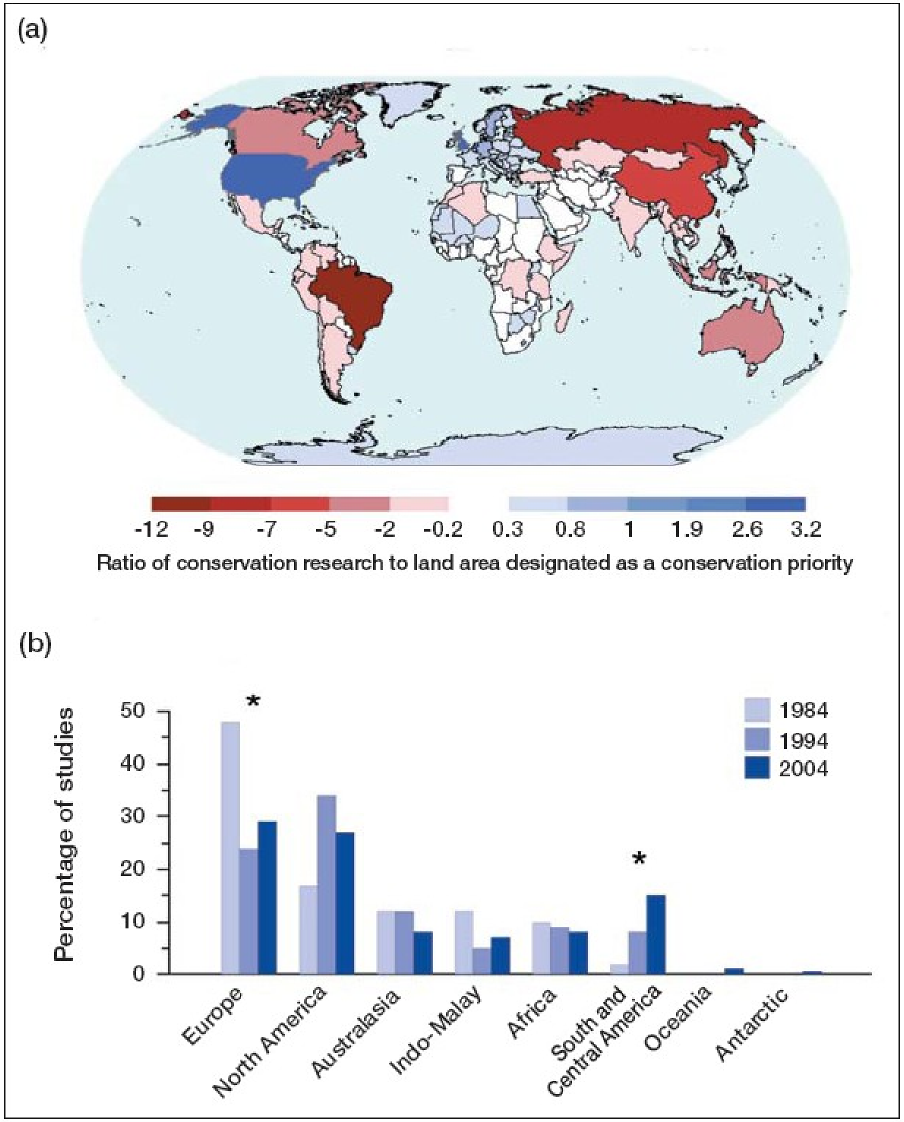



*Figure 2.* (a) Map of the difference in percentage of global conservation priority areas (as defined by three conservation organizations) in a country and the percentage of all conservation research conducted in that country. Blue countries are those with a high ratio of research to conservation priority area and red countries have a low ratio. (b) Percentage of conservation research studies conducted in each of eight different regions of the world in 1984, 1994, and 2004; an asterisk indicates a significant change in the percentage of studies conducted in a region over time ($P < 0.05$).



Fuente: Lawler et al. (2006) Front. Ecol. Environ. 4: 473-480

# La biología de la conservación hoy

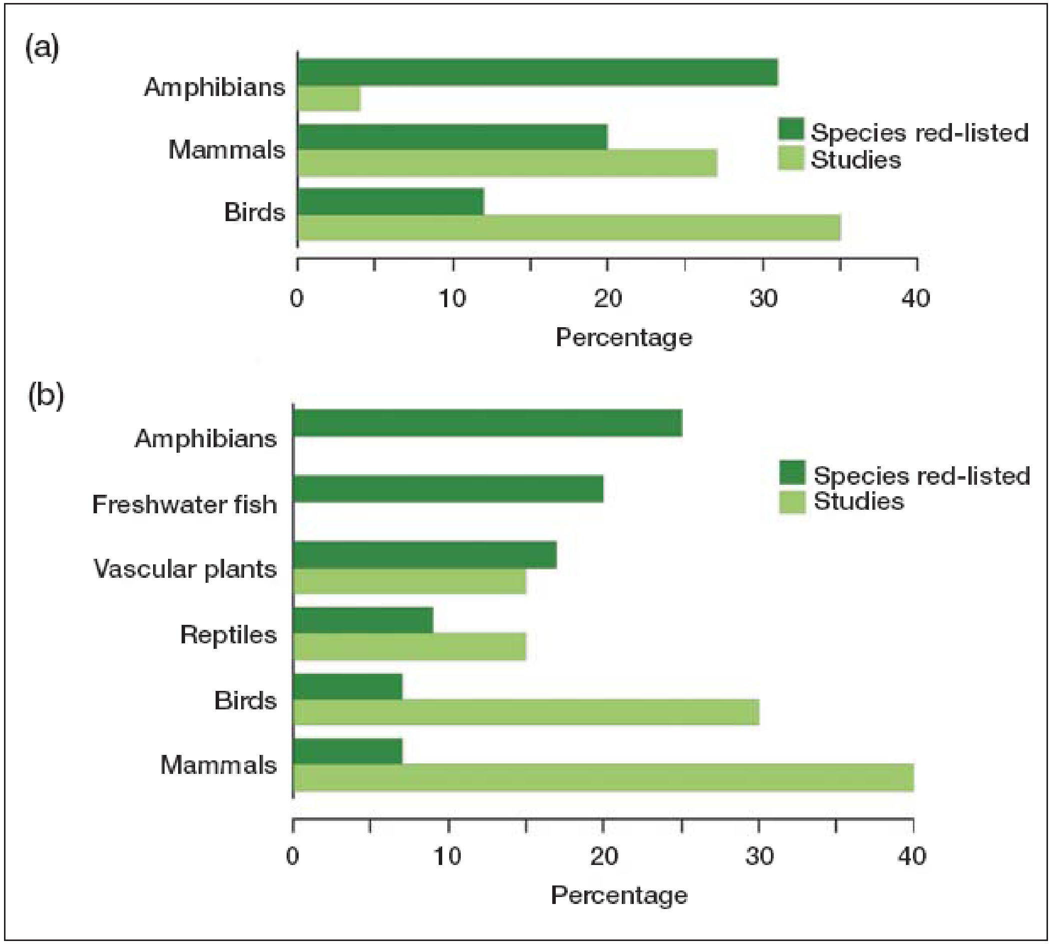



***Figure 3.*** *Comparison of the prevalence of research studies conducted on at-risk species from different taxonomic groups and the degree to which those groups are threatened (a) globally and (b) within the US. At the global scale, darker bars represent the percentage of described species in each taxonomic group that have been red-listed by the IUCN (2004). All described birds and amphibians and 90% of all described mammals have been assessed by the IUCN. For the comparison within the US, darker bars represent percentages of all described species that are considered to be at risk of extinction (Wilcove and Master 2005). Ninety-five percent of the species in each of the taxa within the US have been assessed (Wilcove and Master 2005). For both plots, lighter bars represent the percentage of studies addressing at-risk species in each taxonomic group. Because some studies addressed multiple taxonomic groups, these values do not sum to 100%.*



Fuente: Lawler et al. (2006) Front. Ecol. Environ. 4: 473-480

# La biología de la conservación hoy

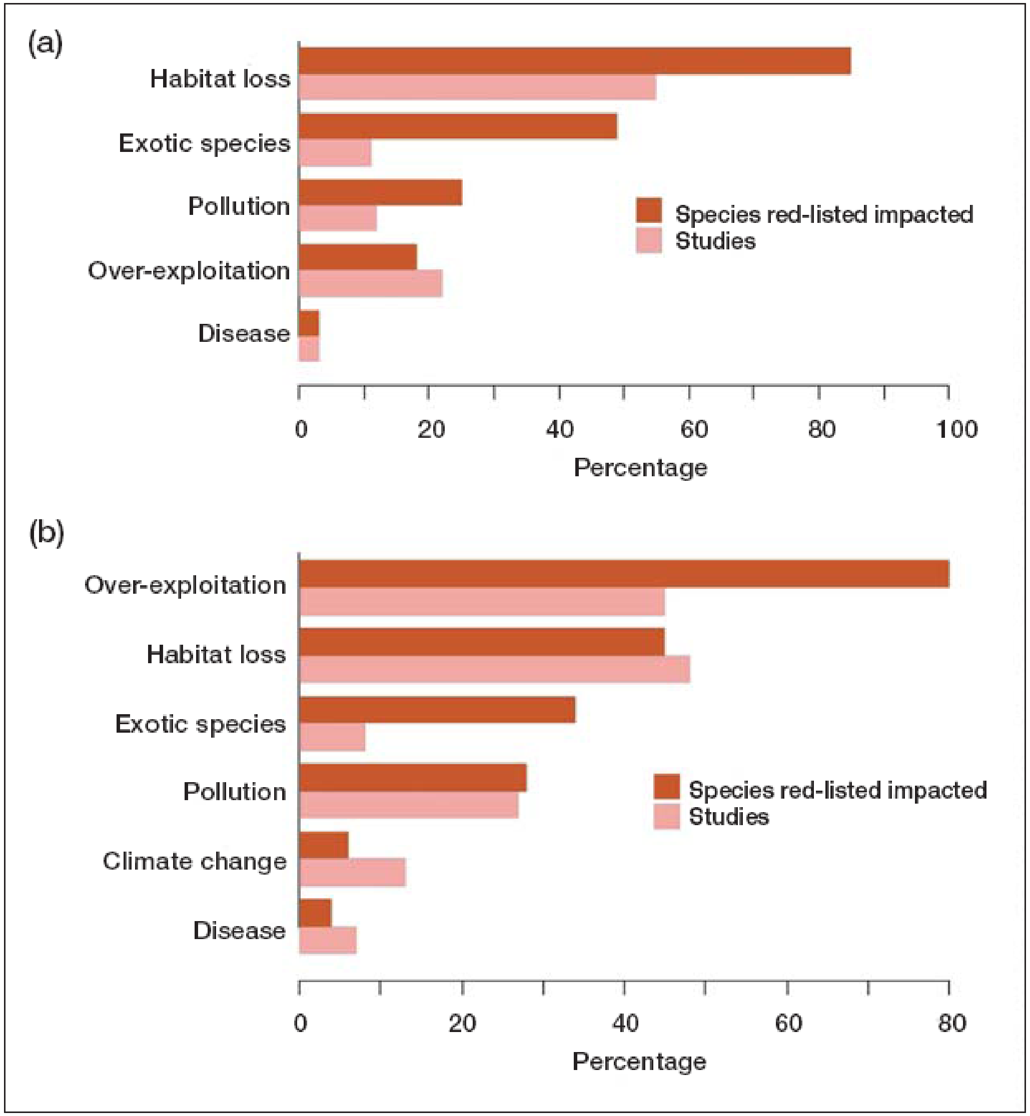



*Figure 5. A comparison of the prevalence of different risks to biodiversity and the degree to which they are reported in the literature, (a) in all systems and (b) in marine systems. The prevalence of threats to species in all systems was derived from Wilcove et al. (1998). The prevalence of threats to marine systems was taken from Kappel (2005).*



Fuente: Lawler et al. (2006) Front. Ecol. Environ. 4: 473-480

# La biología de la conservación hoy

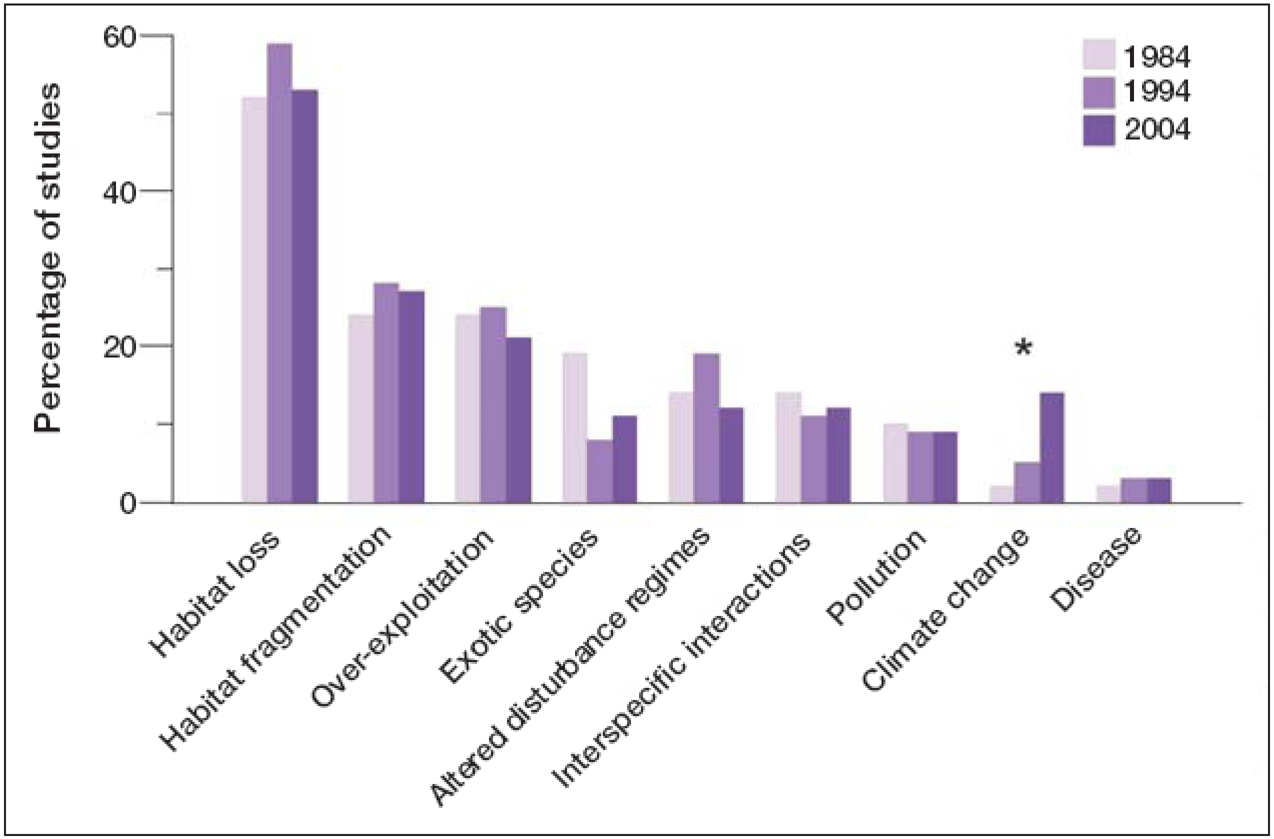



**Figure 6.** *Percentage of conservation studies addressing each of nine threats to biodiversity in 1984, 1994, and 2004. An asterisk indicates a significant change in the percentage of studies over time* ($P < 0.05$).



Fuente: Lawler et al. (2006) Front. Ecol. Environ. 4: 473-480

# Este curso...

**Amenazas a la biodiversidad:**
• Destrucción, fragmentación y degradación de ecosistemas.
• Invasiones biológicas.
• Cambio climático.

**Herramientas conceptuales y metodológicas para la conservación:**
• Filosofía y ética de la conservación.
• Planificación para la conservación.
• Economía ecológica.

**Conservación de procesos ecológicos y evolutivos:**
• Comportamiento animal.
• Ecología poblacional.
• Genética y evolución.
•Biodiversidad y servicios ecosistémicos.

**Ejemplos:**
• Ley nacional de bosques.
• Conservación de la ranita pehuenche.
• Ganadería, ecología del paisaje y biodiversidad.
• Conservación de polinizadores.
• Sostenibilidad y consumo responsable.

# Conclusiones

- Las actividades humanas están llevando a pasar del Holoceno a una nueva era ambiental, el Antropoceno.
- Una característica saliente del Antropoceno es la alta tasa de extinción biológica, lo que podría llevar en los próximos siglos a la sexta extinción en masa en la Tierra.
- La biología de la conservación estudia las causas de la pérdida de la diversidad biológica y de cómo minimizar esta pérdida.
- Los biólogos de la conservación deben orientar su investigación hacia los biomas y factores de amenaza prioritarios para la conservación.