Amenazas a la biodiversidad: Pérdida y degradación del hábitat

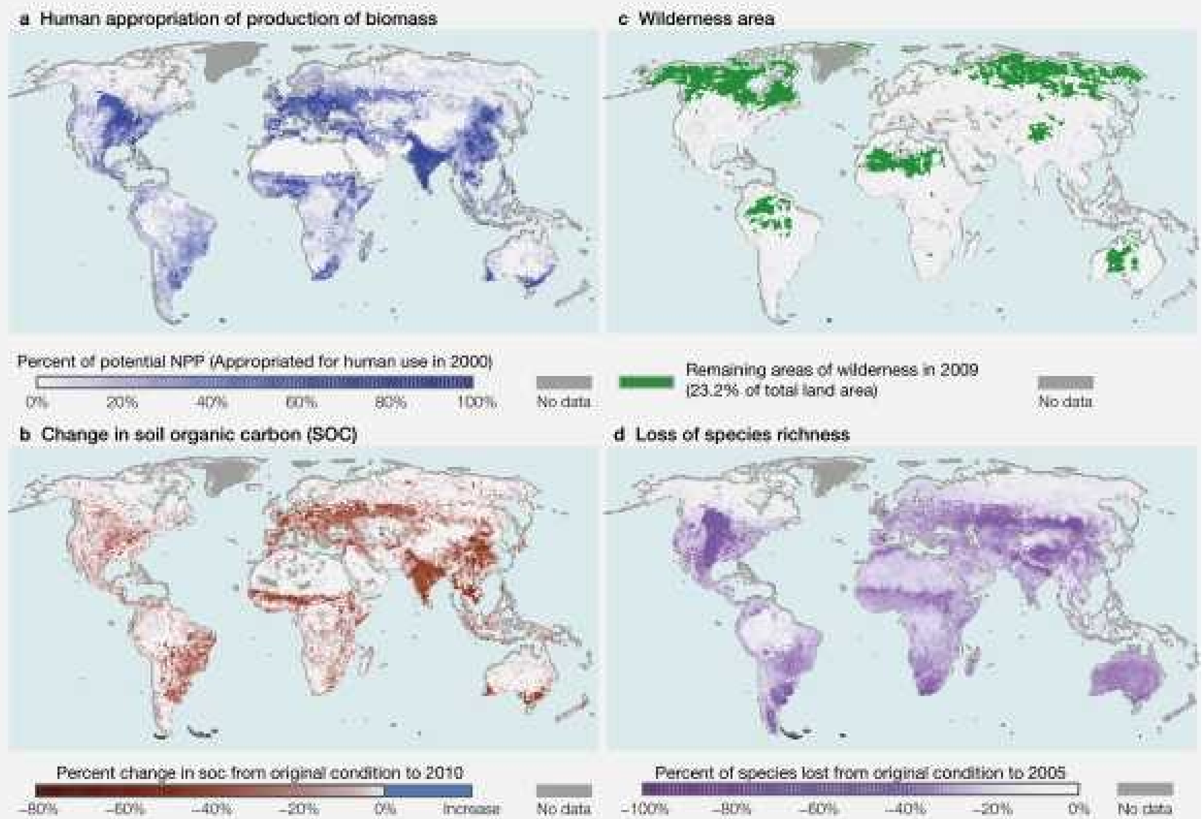
Material de lectura recomendado

- Groom et al., caps. 6 y 7
- Sohdi & Ehrlich, caps. 4 y 5
- Referencias de las diapositivas

Degradación de los ecosistemas

Figure SPM 7 **Human activity has changed the surface of the planet in profound and far-reaching ways.**

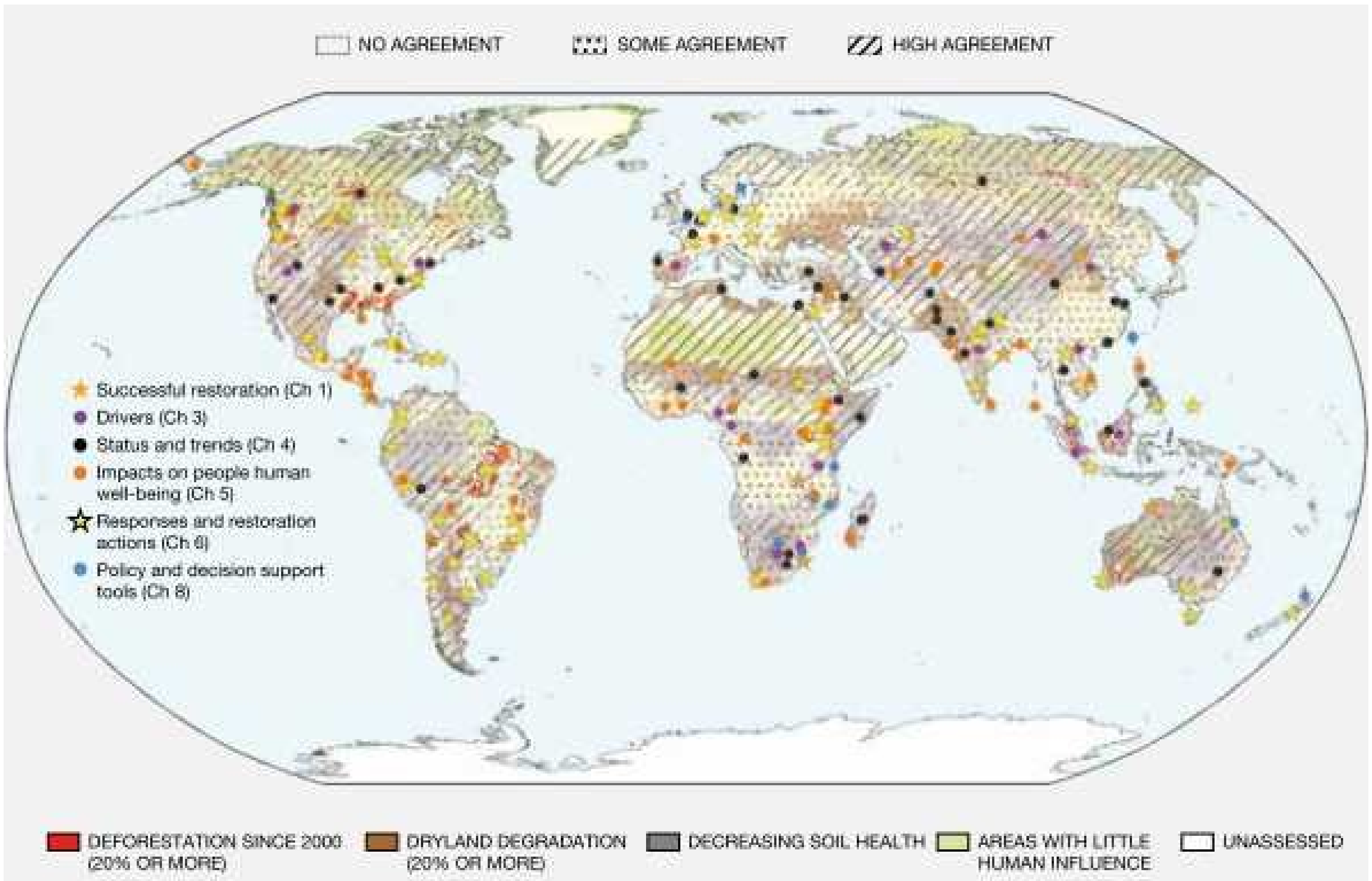
Panel (a) shows the degree to which humans have appropriated production of biomass.[12] In some cases, particularly areas of intensive agriculture, human use is equivalent to 100 per cent of the total biomass that would have been produced by plant natural conditions (darker blue). Panel (b) shows the decline in soil organic carbon, an indicator of soil degradation (decline in red, increase in blue), relative to an estimated historical condition that predates anthropogenic land use.[13,14] Panel (c) shows the parts of the land surface that can be considered as "wilderness". The areas shown in green are wilderness in the sense that ecological and evolutionary processes operate there with minimal human disturbance.[15] In the remaining three quarters of the Earth's surface, natural processes are impaired by human activities to a significant degree. Panel (d) shows (in purple) the levels of species loss, estimated for all species groups, relative to the originally-present species composition.[16]



Scholes et al. (2018) Summary for policymakers of the assessment report on land degradation and restoration. IPBES

Degradación de los ecosistemas

Figure SPM 1 **Land degradation is a pervasive, systemic phenomenon: it occurs in all parts of the terrestrial world and can take many forms.**

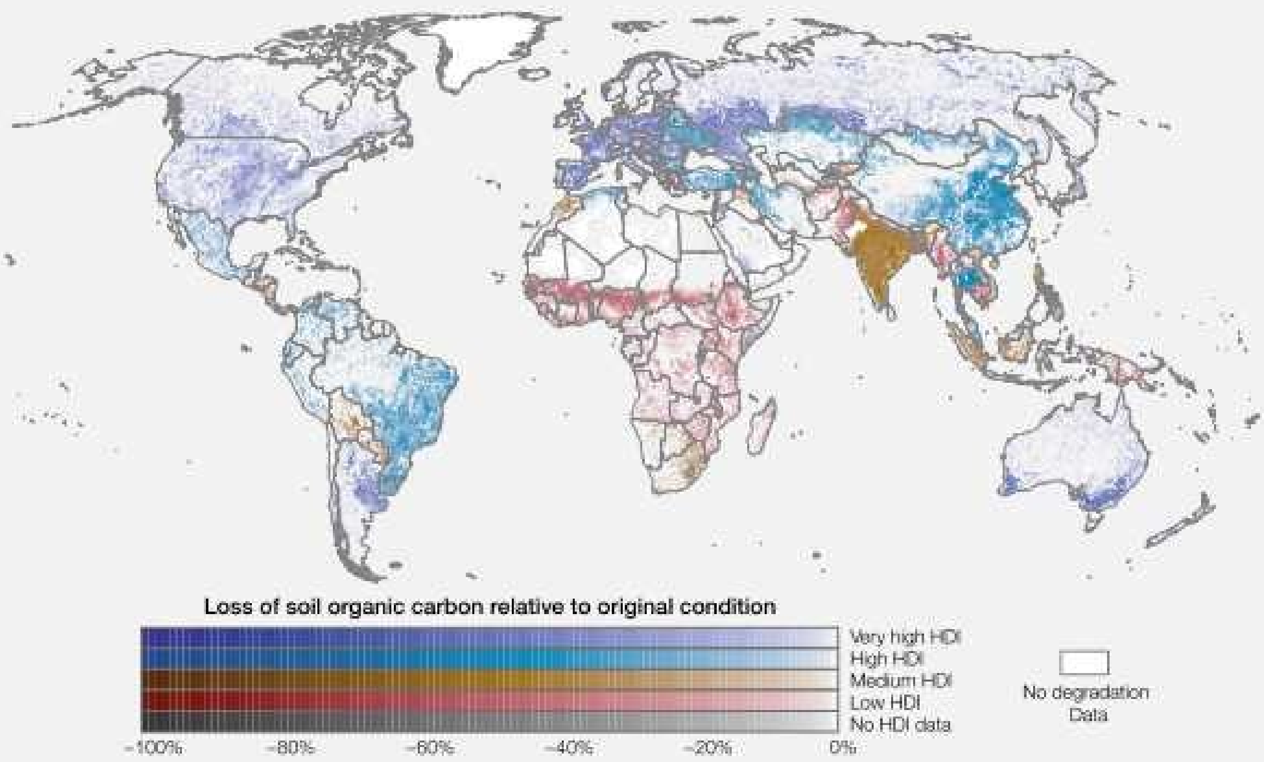


Scholes et al. (2018) Summary for policymakers of the assessment report on land degradation and restoration. IPBES

Degradación de los ecosistemas

Figure SPM 9 **Land degradation affects countries of all income levels and at all levels of human development.**

Some of the most degraded areas in the world, such as Western Europe and parts of Australia, are also the high GDP countries. However, the negative impacts of land degradation on human well-being are likely to be more pronounced in locations where degradation overlaps with poverty, low institutional capacity and weak social safety nets. In this map, countries are coloured according to their Human Development Index (HDI) score,[23] while loss of soil organic carbon relative to estimated original condition (one indicator of land degradation) is illustrated by the lightness or darkness of each pixel. HDI is a composite statistic that is commonly used to indicate human development based on data on education, life expectancy and per capita income. Change in soil organic carbon is modelled relative to estimated quantities prior to anthropogenic land use and land cover change. Source: Data on soil organic carbon from Van der Esch *et al.* (2017)[21] and Stoorvogel *et al.* (2017).[22]



Scholes et al. (2018) Summary for policymakers of the assessment report on land degradation and restoration. IPBES

Degradación de los ecosistemas

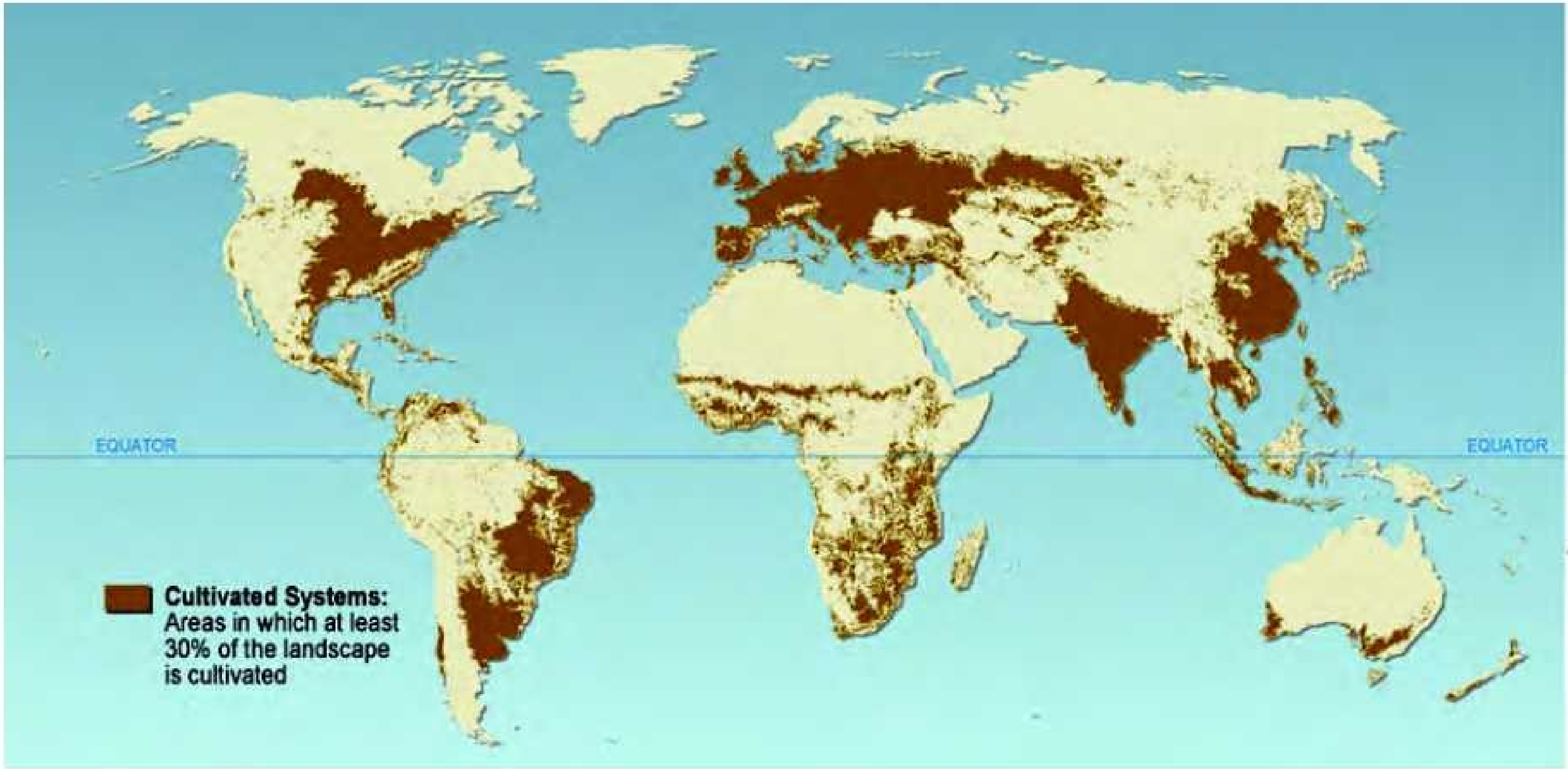
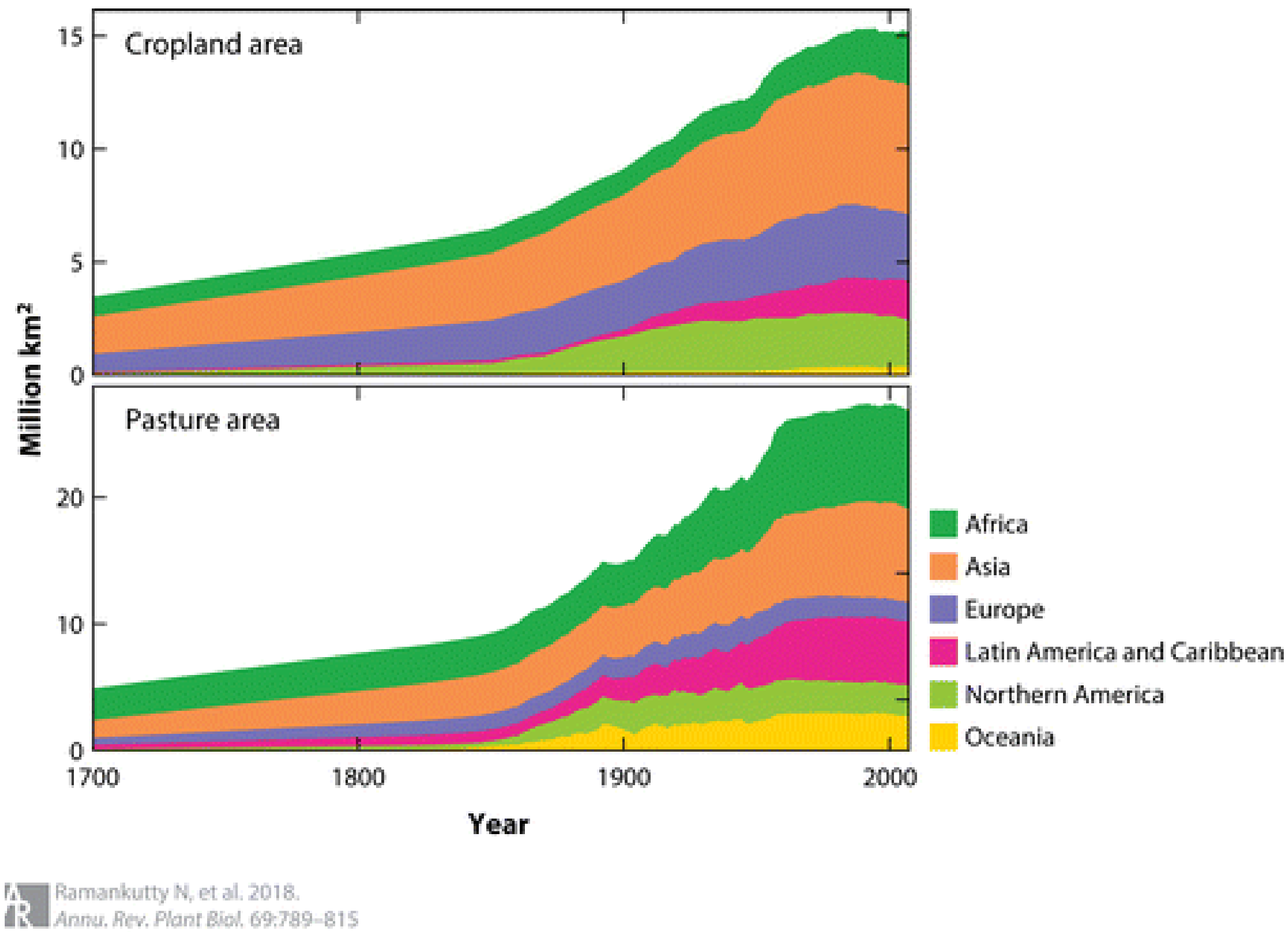


Figure 4.2 Extent of land area cultivated globally by the year 2000. Reprinted from MEA (2005).

Sohdi & Ehrlich (2010) Conservation Biology for All. Oxford Univ Press

Degradación de los ecosistemas



Ramankutty et al. (2018) Ann Rev Plant Biol 69: 789: 815

Degradación de los ecosistemas

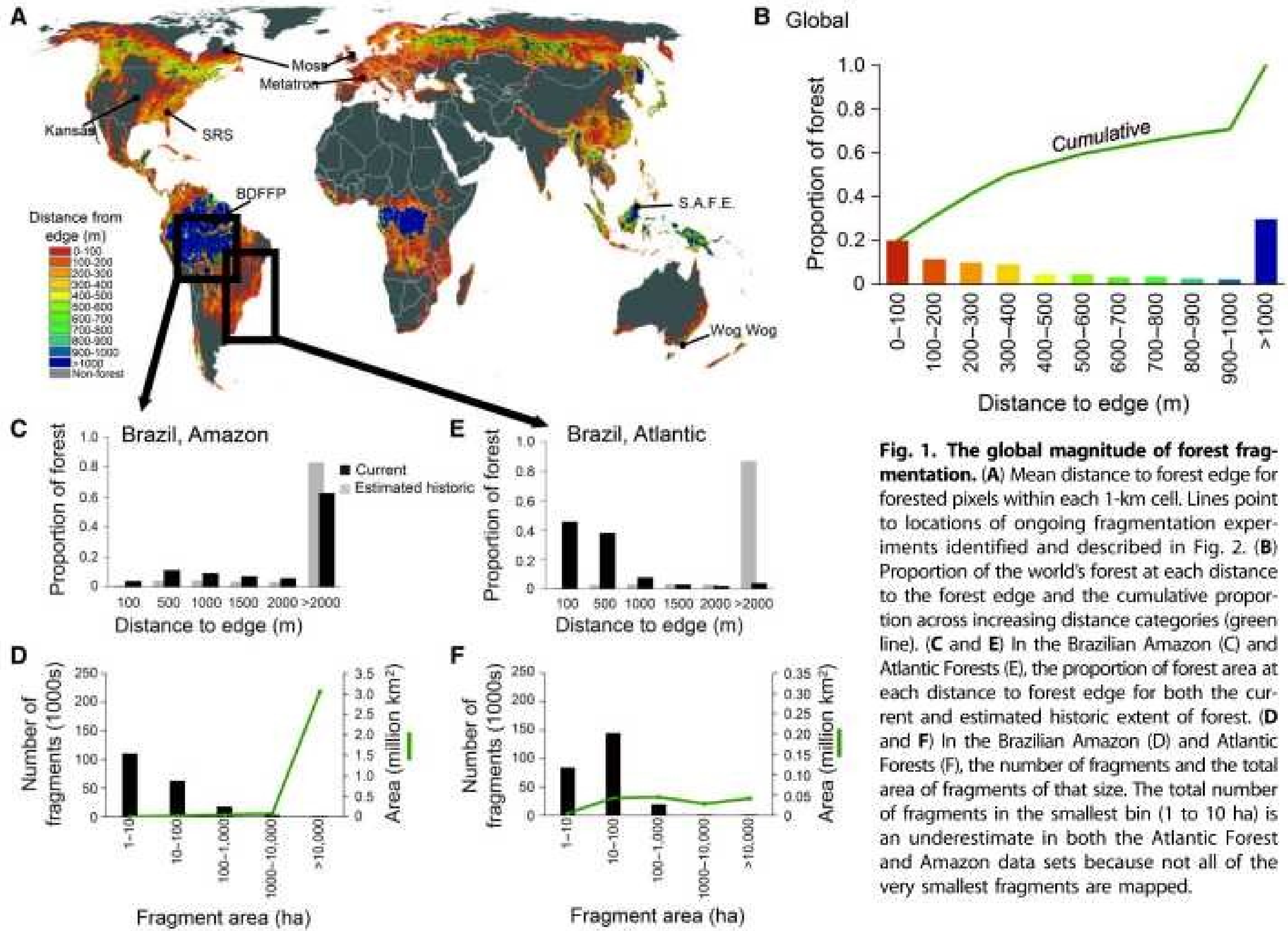


Fig. 1. The global magnitude of forest fragmentation. (**A**) Mean distance to forest edge for forested pixels within each 1-km cell. Lines point to locations of ongoing fragmentation experiments identified and described in Fig. 2. (**B**) Proportion of the world's forest at each distance to the forest edge and the cumulative proportion across increasing distance categories (green line). (**C** and **E**) In the Brazilian Amazon (C) and Atlantic Forests (E), the proportion of forest area at each distance to forest edge for both the current and estimated historic extent of forest. (**D** and **F**) In the Brazilian Amazon (D) and Atlantic Forests (F), the number of fragments and the total area of fragments of that size. The total number of fragments in the smallest bin (1 to 10 ha) is an underestimate in both the Atlantic Forest and Amazon data sets because not all of the very smallest fragments are mapped.

Haddad et a. (2015) Science Advances 1: e1500052

Biomas del mundo

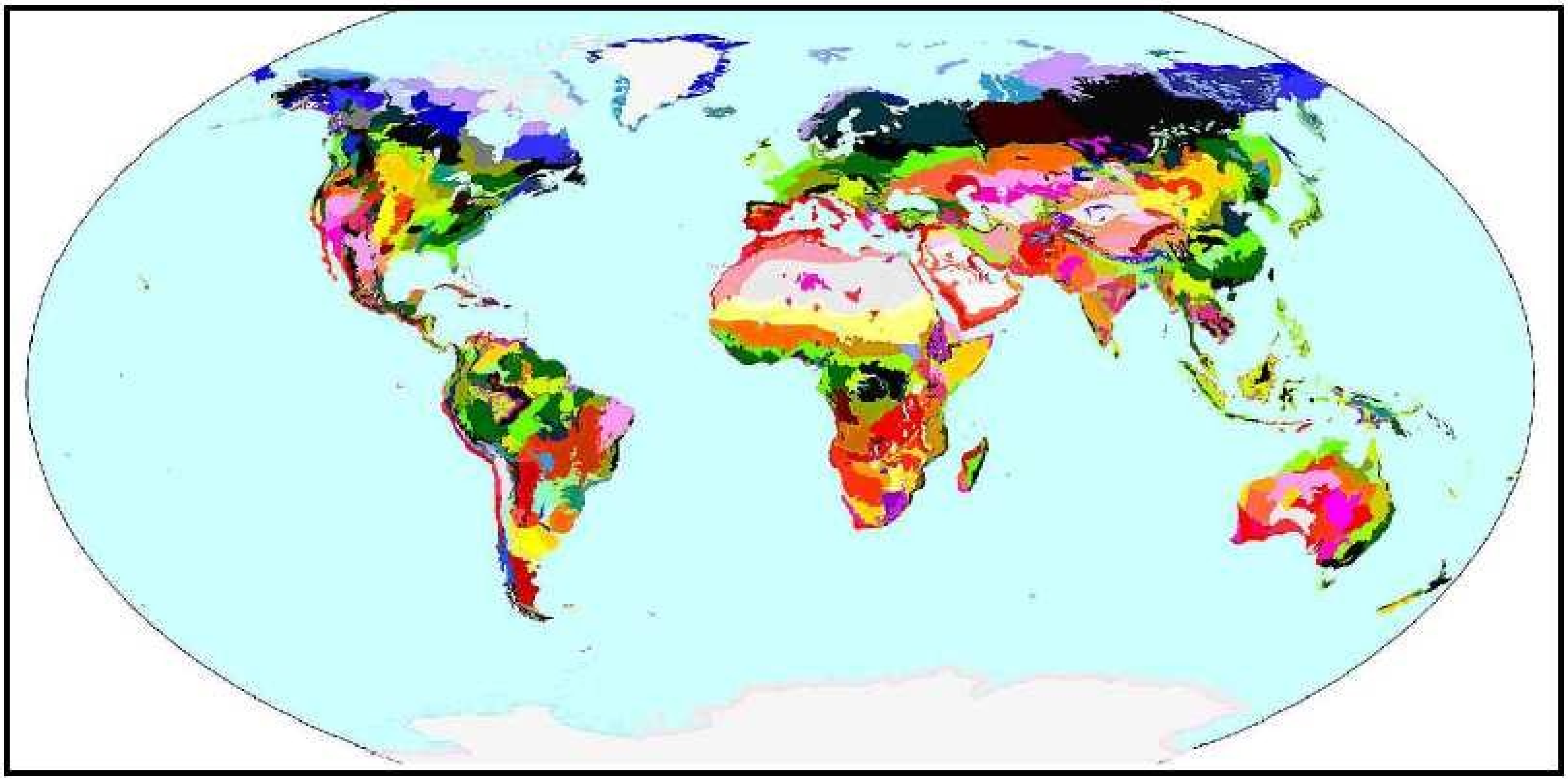


Figure 2. The map of terrestrial ecoregions of the world recognizes 867 distinct units, roughly a fourfold increase in biogeographic discrimination over that of the 193 units of Udvardy (1975). Maps of freshwater and marine ecoregions are similarly needed for conservation planning.

Fuente: Olson et al. (2001) BioScience 51: 933-938

Biomas antropogénicos

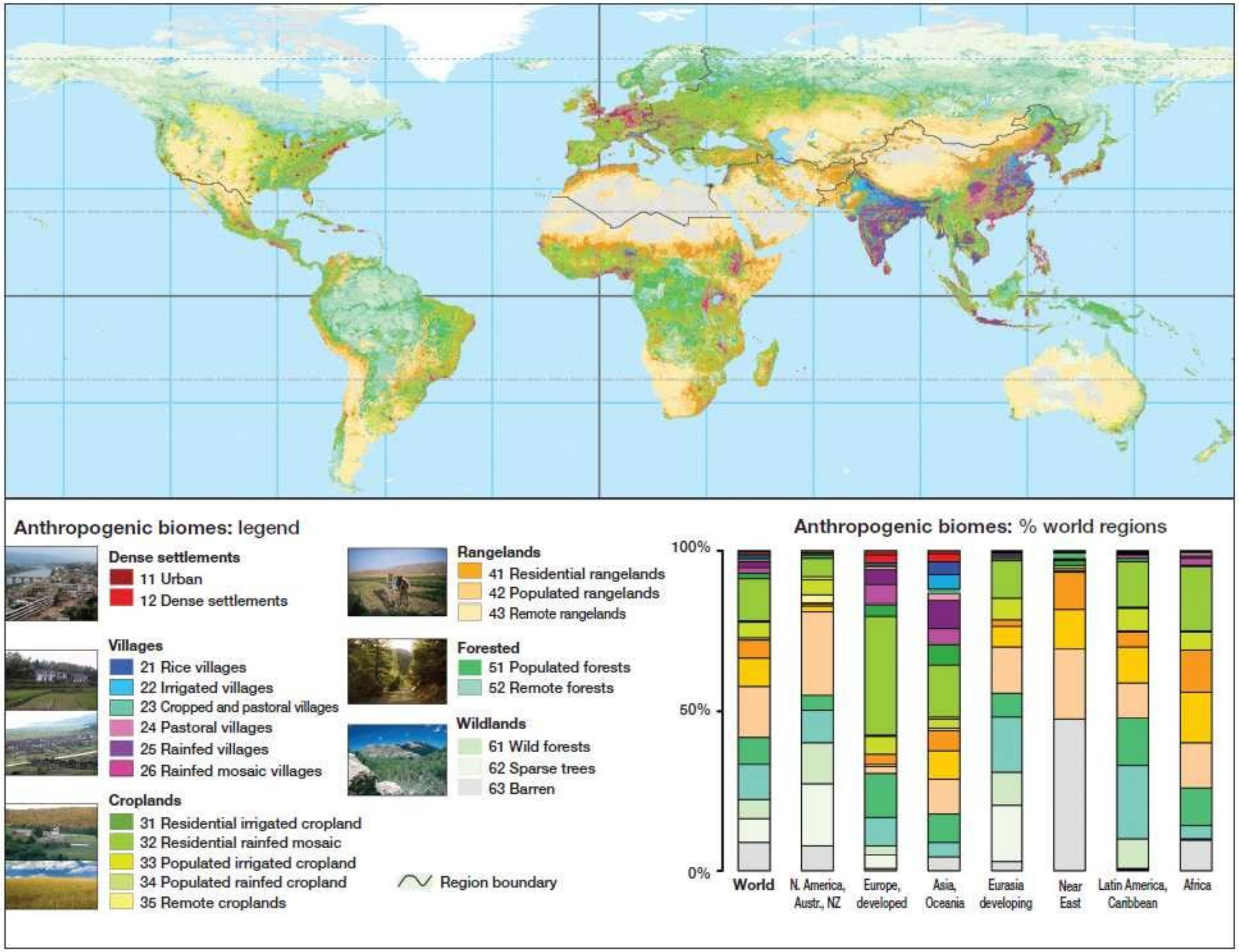


Figure 1. Anthropogenic biomes: world map and regional areas. Biomes are organized into groups (Table 1), and sorted in order of population density. Map scale = 1:160 000 000, Plate Carrée projection (geographic), 5 arc minute resolution (5' = 0.0833°). Regional biome areas are detailed in WebTable 3; WebPanel 2 provides interactive versions of this map.

Fuente: Ellis & Ramakutty (2008) Front. Ecol. Environ. 8: 439-447

Biomas amenazados por la destrucción del hábitat

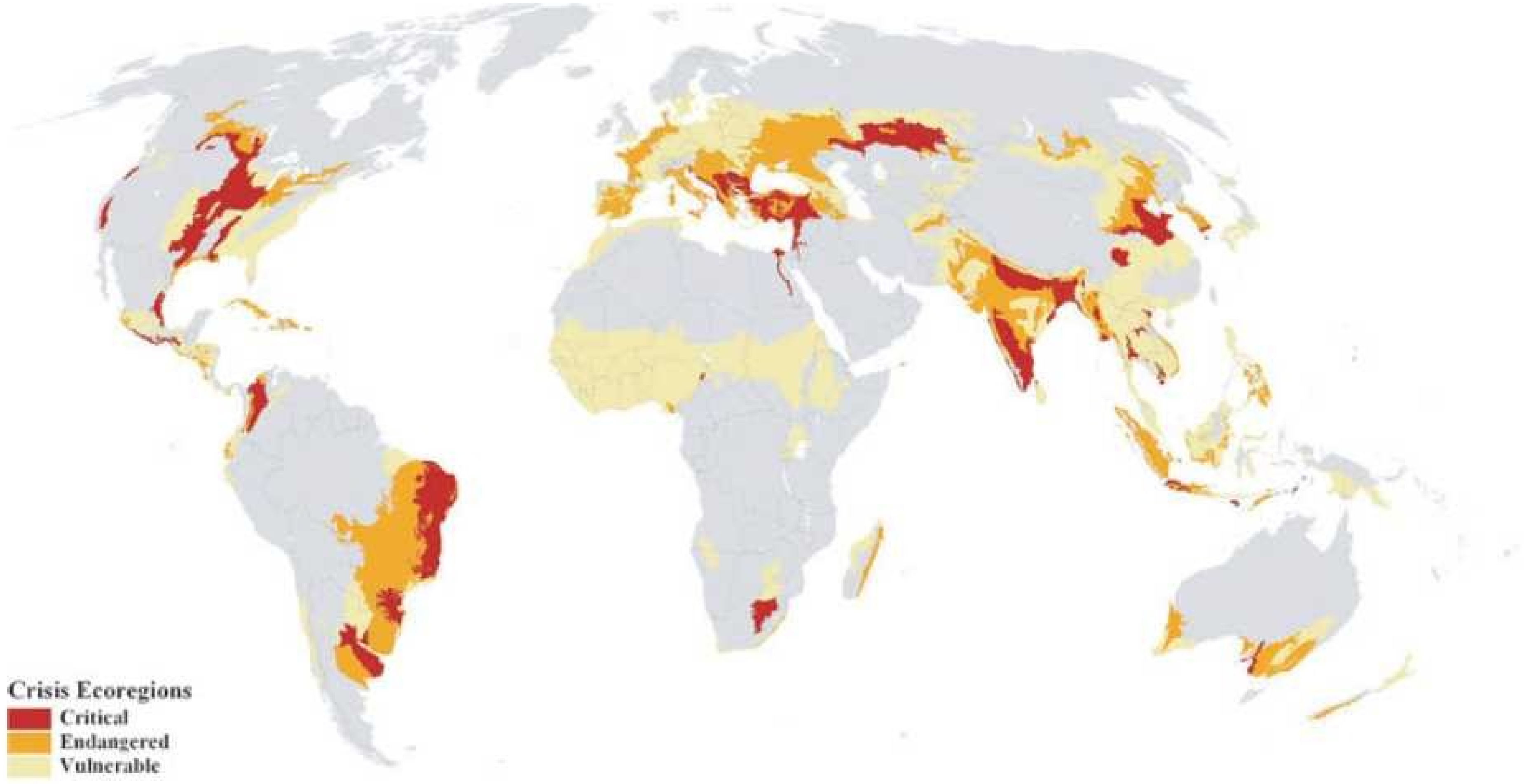


Figure 4 Map of crisis ecoregions. Vulnerable, Endangered, and Critically endangered, ecoregions were classified as described in text and shown in Fig. 3.

Fuente: Hoekstra et al. (2005) Ecol. Lett. 8: 23-29

Biomas amenazados por la destrucción del hábitat

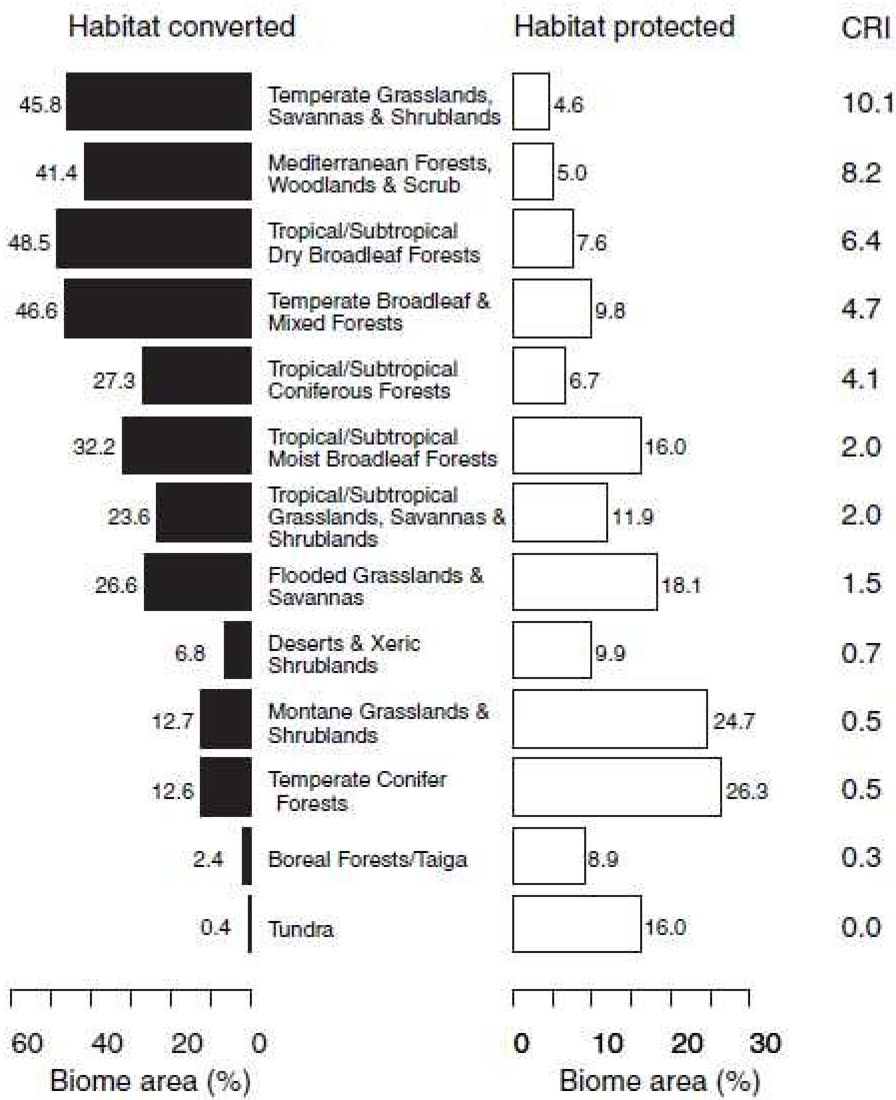
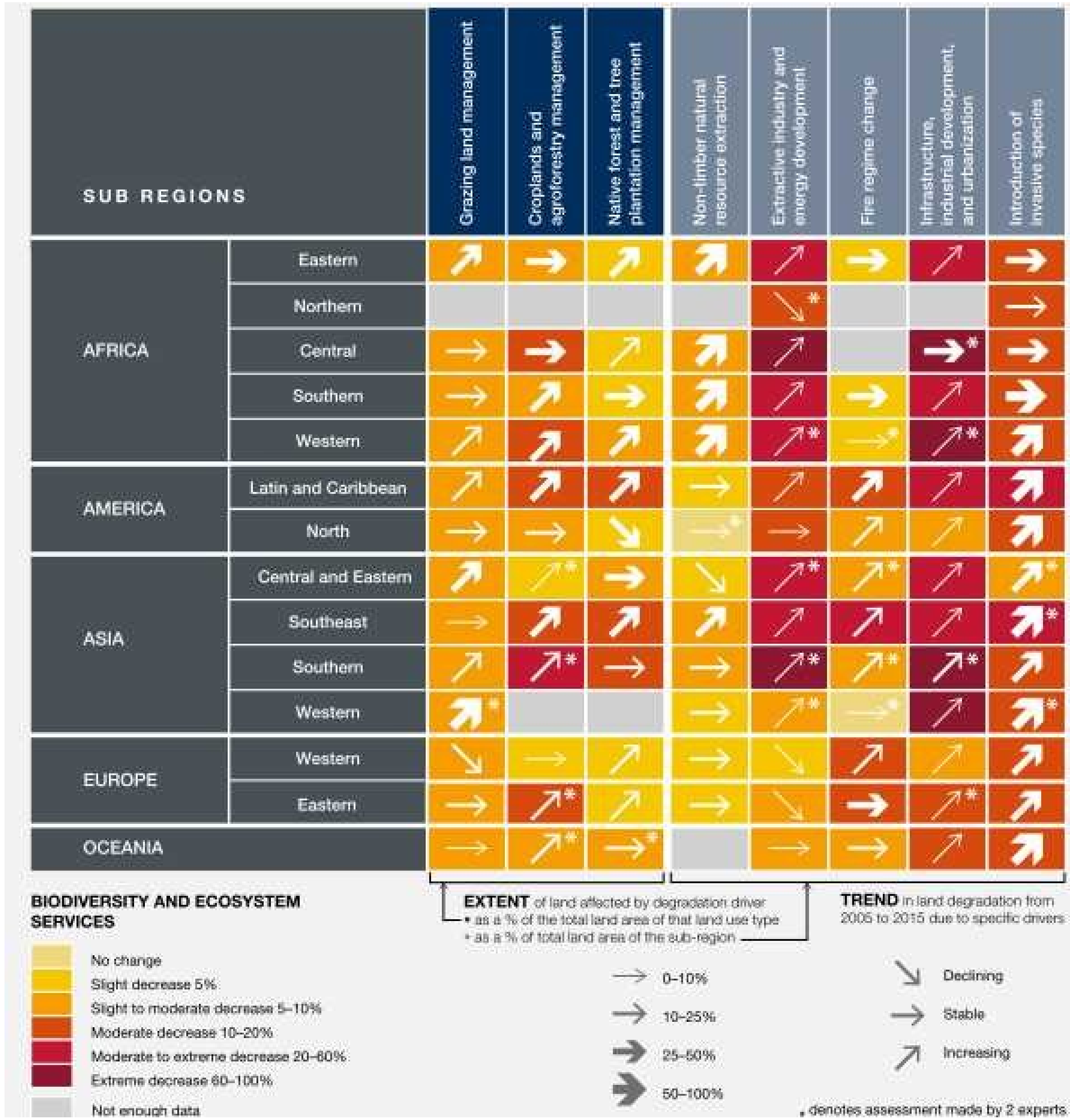


Figure 1 Habitat conversion and protection in the world's 13 terrestrial biomes. Biomes are ordered by their Conservation Risk Index (CRI). CRI was calculated as the ratio of per cent area converted to per cent area protected as an index of relative risk of biome-wide biodiversity loss.

Fuente: Hoekstra et al. (2005) Ecol. Lett. 8: 23-29

Figure SPM 5 **Status, trend and extent of direct drivers of land degradation across subregions globally.**



Scholes et al. (2018) Summary for policymakers of the assessment report on land degradation and restoration. IPBES

Fragmentación de bosques tropicales y emisión de carbono

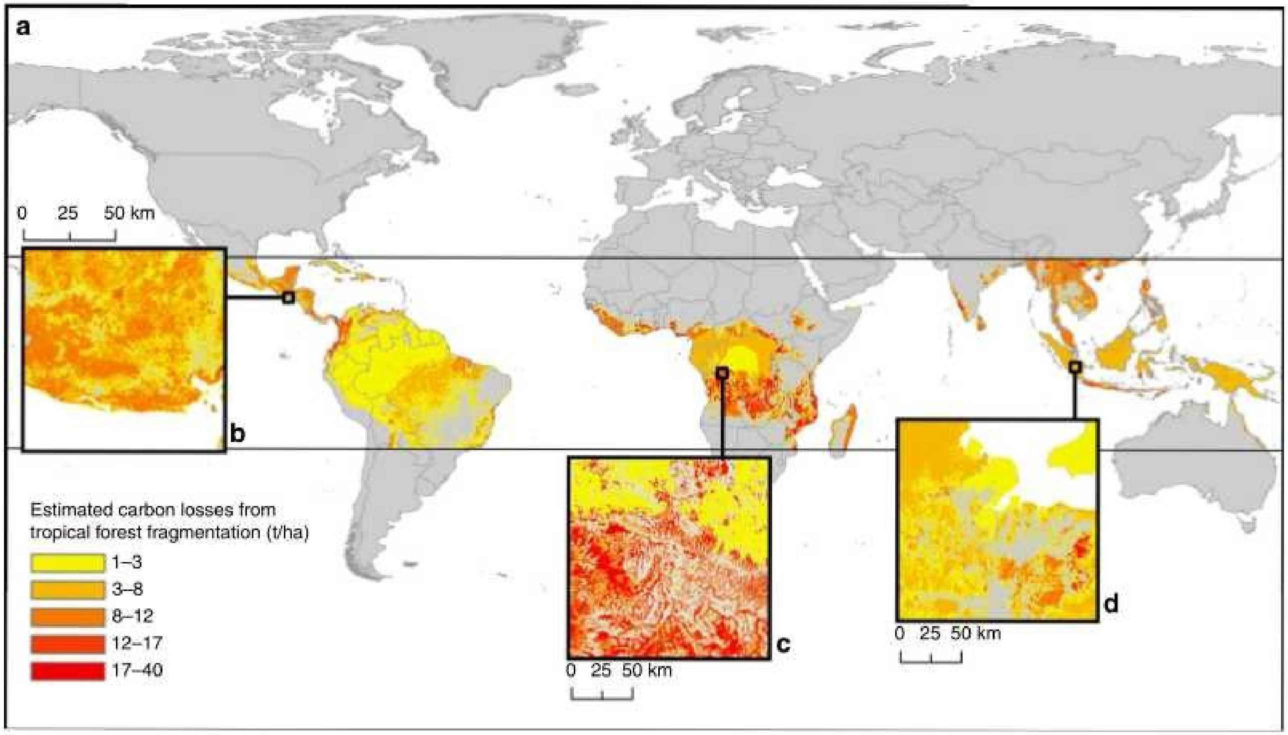


Figure 3 | Worldwide carbon emissions due to fragmentation of tropical forests. (**a**) Colours represent the estimated carbon losses for each fragment, setting edge depth *d* to 100 m and relative carbon losses in forest edges *e* to 50%. Insets illustrate exemplary regional carbon emissions for (**b**) tropical America (89.752 W, 13.515 N), (**c**) tropical Africa (17.206 E, 4.499 S) and (**d**) tropical South-East Asia (103.898 E, 3.091 S).

Brinck et al. (2017) Nature Communications 8: 14855

Ejemplo: Destrucción de hábitat en el Norte de Córdoba

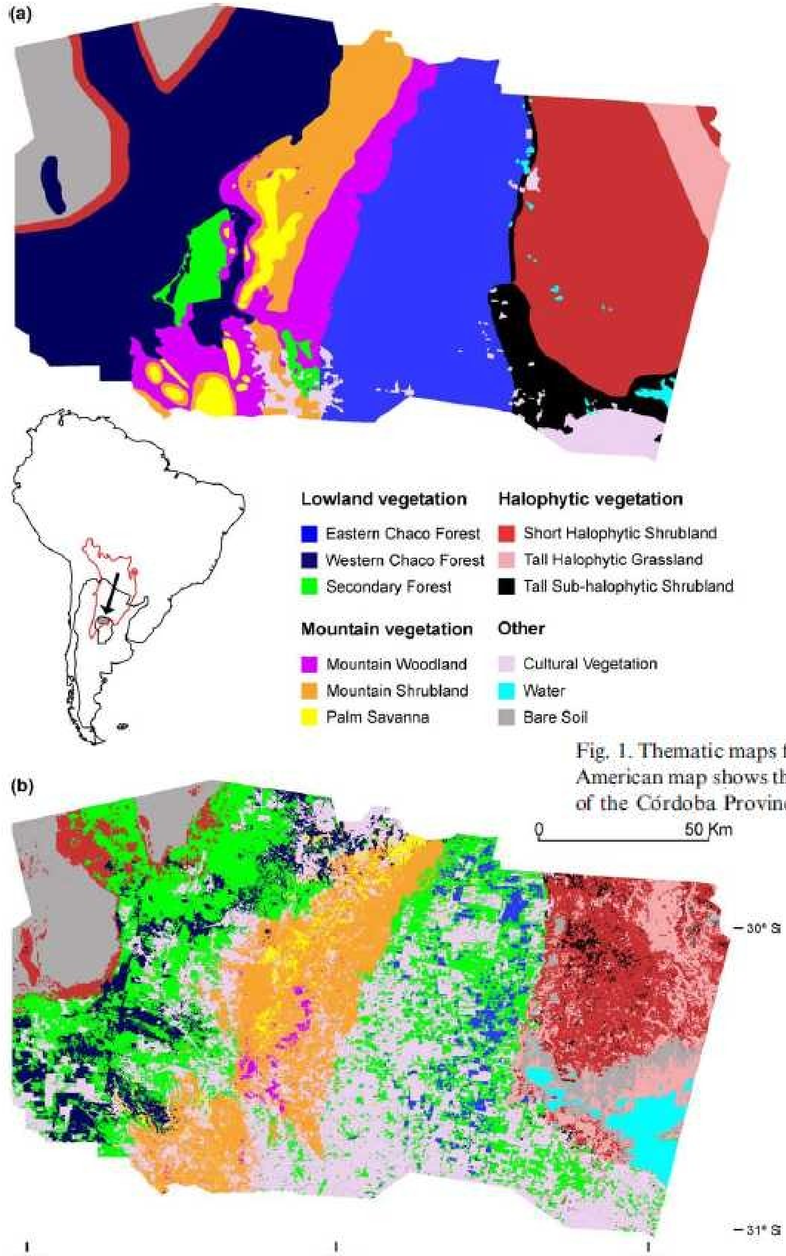
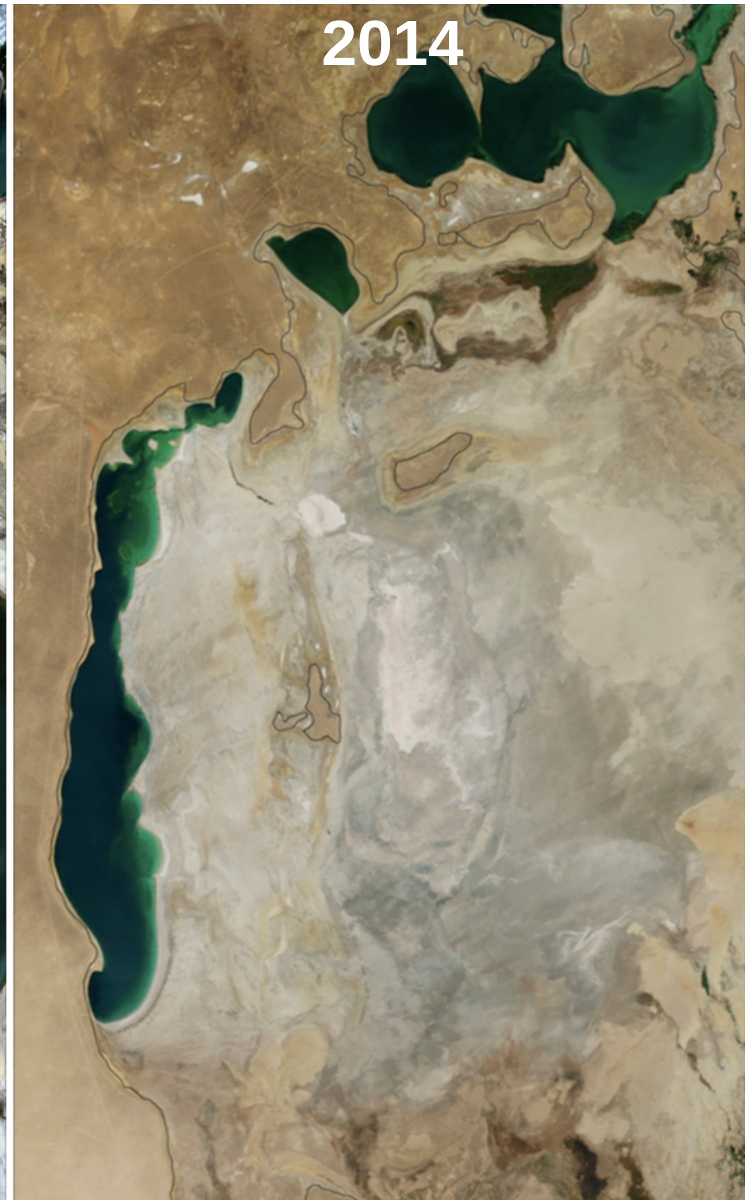


Fig. 1. Thematic maps for the study area: (a) 1969 map; (b) 1999 map. Coincident colors in both maps identify the same land cover types. The South American map shows the location of the study area (pointed with an arrow) at the southern edge of the Gran Chaco (red outline) in the northern part of the Córdoba Province, Argentina.

Fuente: Zak et al. (2004) Biol. Cons. 120: 589-598

Ejemplo: agriculturización en el Valle de Uco

Ejemplo: Destrucción de hábitat en el Mar Aral



Fuente: Wikipedia

Ejemplo: Destrucción arrecifes de coral del SE de Asia

Figure 1. Map of study region, sub-regions, and the 2667 surveyed reefs (green dots).
doi:10.1371/journal.pone.0000711.g001

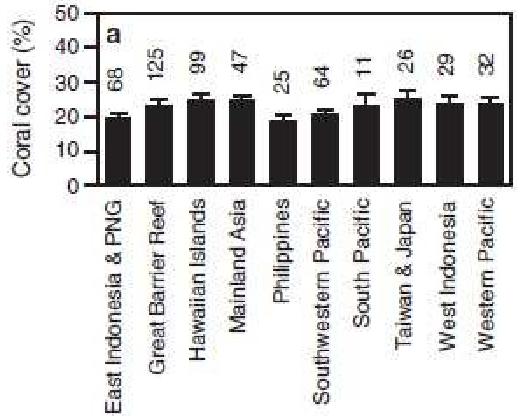
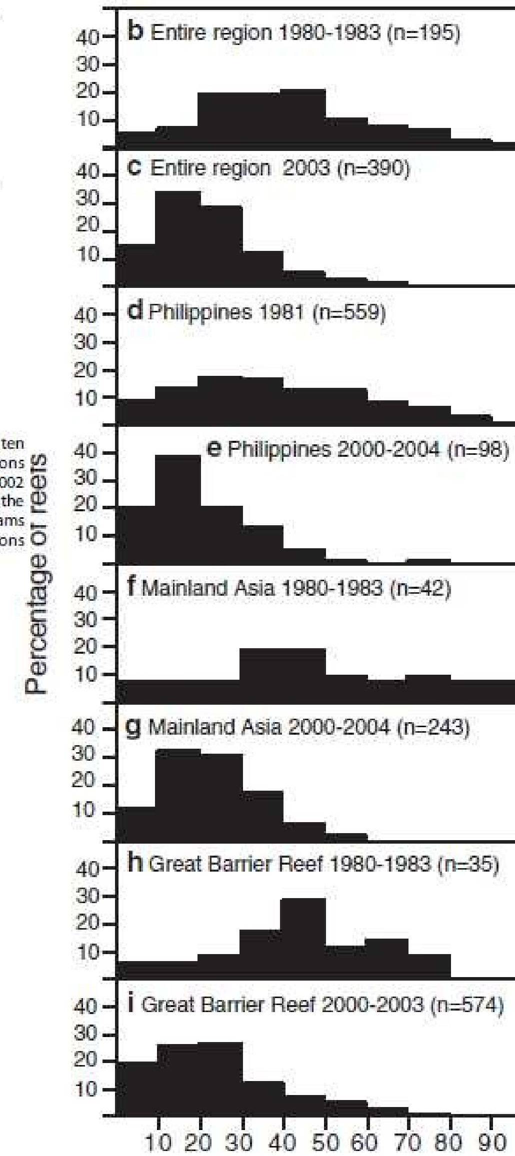


Figure 2. Coral cover in the Indo-Pacific. (a) Cover (means ± 1 SE) in ten subregions of the Indo-Pacific. Data are from 2003 for seven subregions and from 2002 for three subregions not adequately sampled after 2002 (Hawaiian Islands, Taiwan & Japan, and Western Pacific). Values above the bars are the number of reefs surveyed in each subregion. (b-i) Histograms illustrating percent coral cover in the Indo-Pacific and selected subregions during different periods. (d) is based on [45].
doi:10.1371/journal.pone.0000711.g002



Fuente: Bruno & Selik (2007) PLoS ONE 2: e711

Proceso de degradación del hábitat

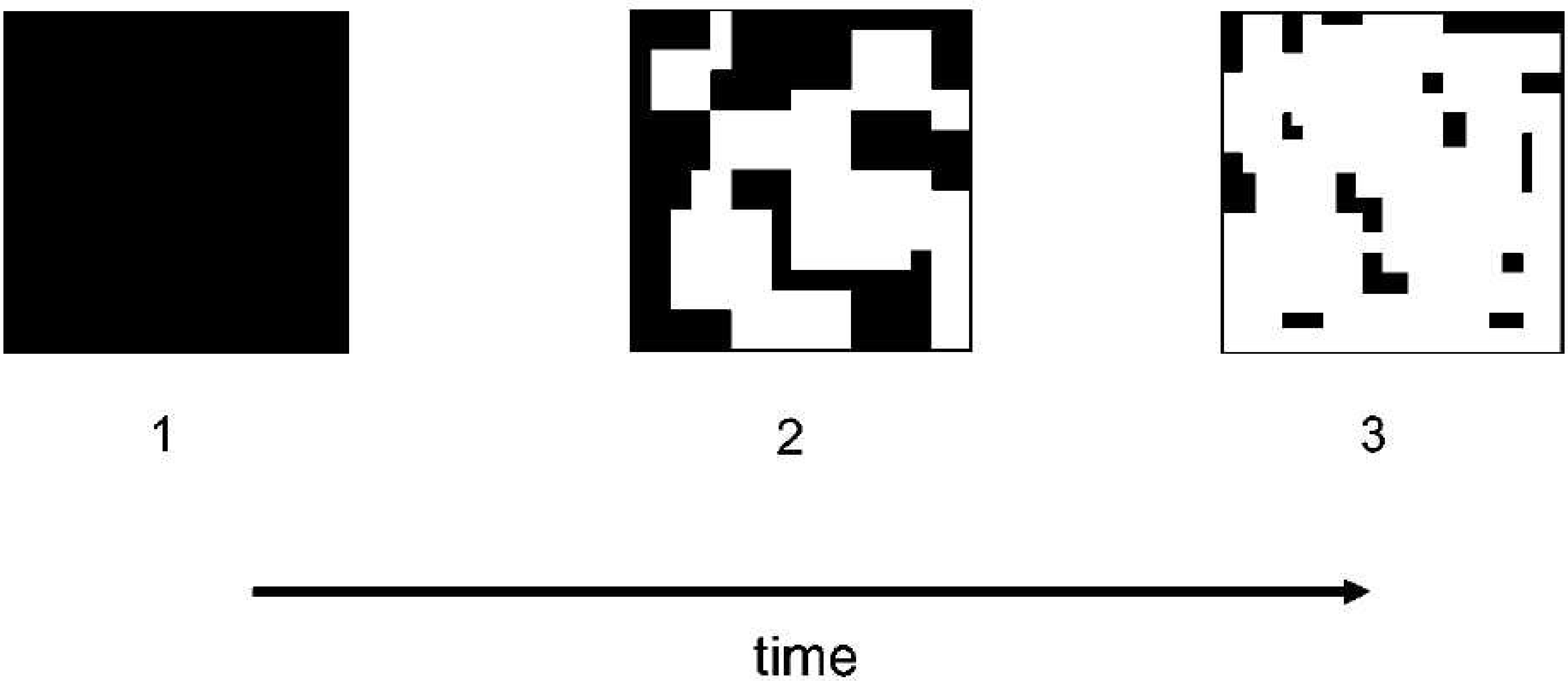


Figure 1 The process of habitat fragmentation, where "a large expanse of habitat is transformed into a number of smaller patches of smaller total area, isolated from each other by a matrix of habitats unlike the original" (Wilcove et al. 1986). Black areas represent habitat and white areas represent matrix.

Fuente: Fahrig (2003) Ann. Rev. Ecol., Evol. & Syst. 34: 487-515

Proceso de degradación del hábitat

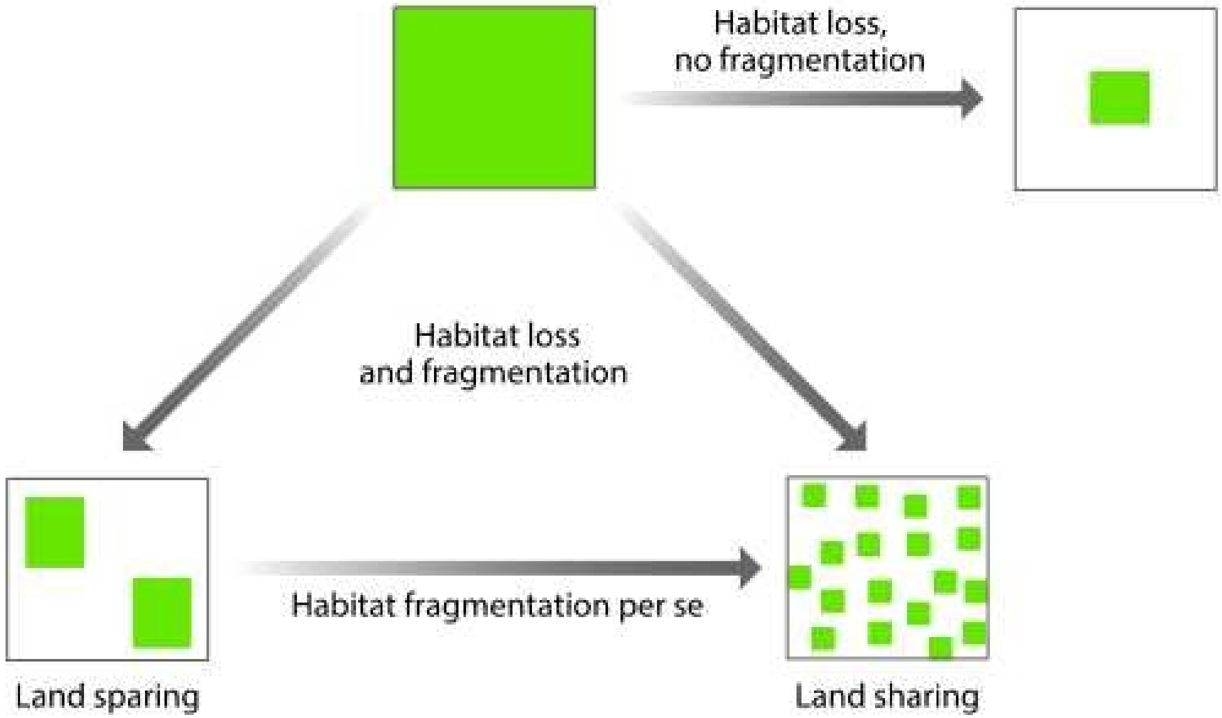
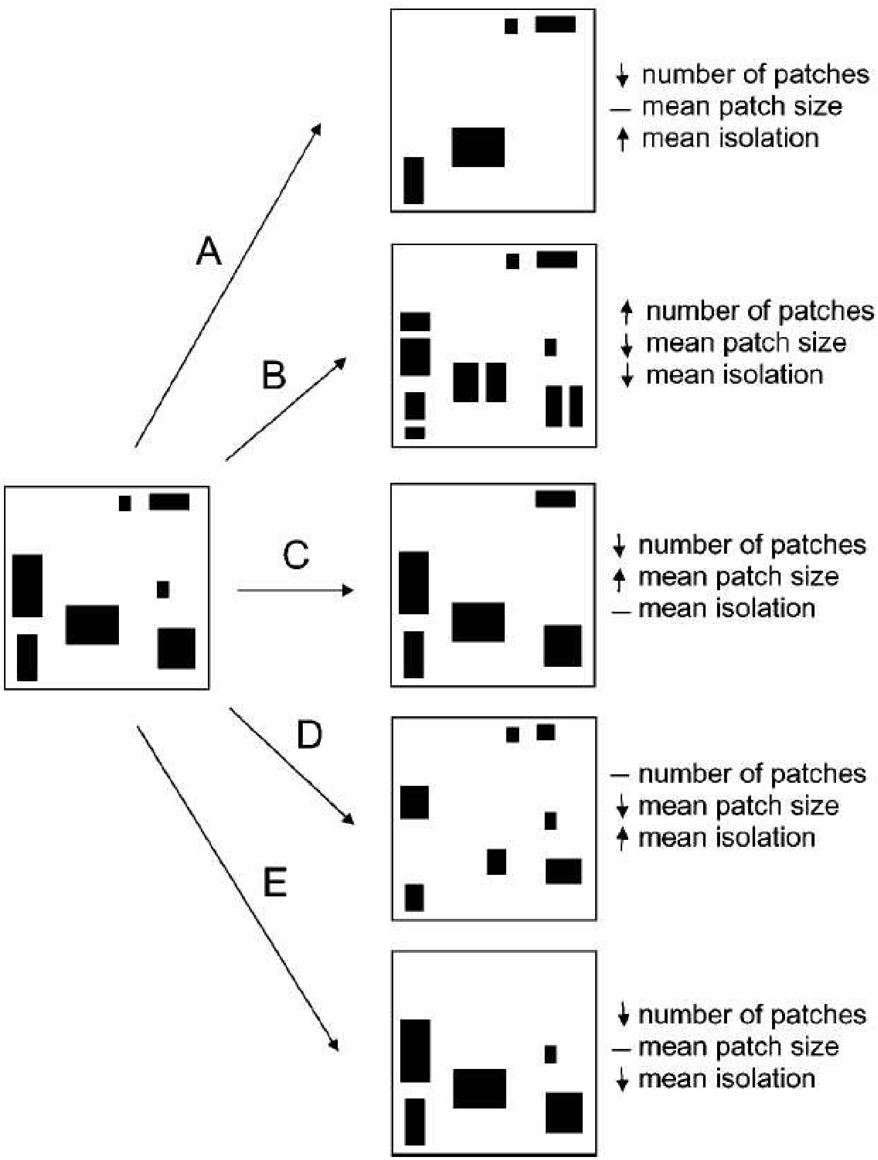


Figure 2

Habitat loss is a process whereby habitat is destroyed over time. In contrast, habitat fragmentation per se (hereafter referred to as habitat fragmentation) is a difference in spatial pattern. For a given amount of habitat, a more fragmented pattern has more, smaller patches, with more total edge in the landscape. The current dominant paradigm assumes that habitat fragmentation generally has negative effects on biodiversity. If this is true, then policies should favor land sparing over land sharing.

Fuente: Fahrig (2017) Ann. Rev. Ecol., Evol. & Syst. 48: 1-23

Proceso de degradación del hábitat

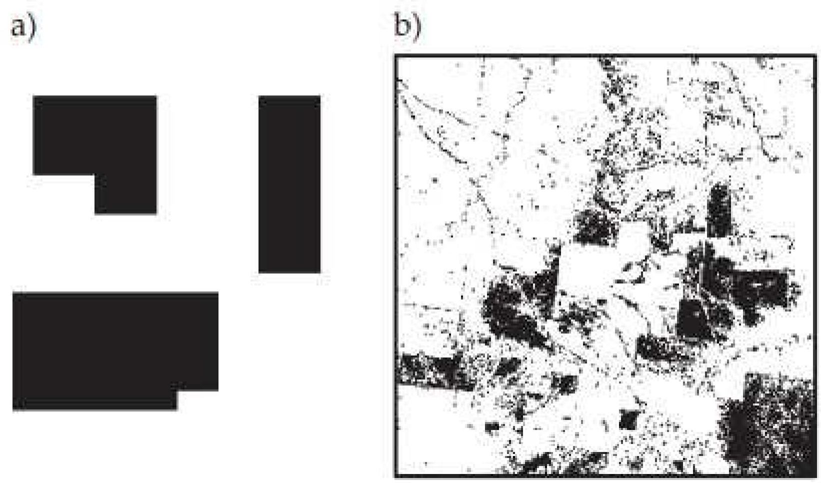


- Aumento del número de fragmentos.
- Disminución del tamaño de los fragmentos.
- Aumento en el aislamiento.
- Aumento de la relación borde:área (efecto borde).

Figure 2 Illustration of habitat loss resulting in some, but not all, of the other three expected effects of habitat fragmentation on landscape pattern. Expected effects are (*a*) an increase in the number of patches, (*b*) a decrease in mean patch size, and (*c*) an increase in mean patch isolation (nearest neighbor distance). Actual changes are indicated by arrows.

Fuente: Fahrig (2003) Ann. Rev. Ecol., Evol. & Syst. 34: 487-515

Proceso de degradación del hábitat



Individual fragments	**Whole landscapes**
size	compositional gradients
shape	diversity of land-uses
core area	number of fragments
vegetation type	aggregation
isolation	structural connectivity

Figure 5.1 Comparison of the types of attributes of a) individual fragments and b) whole landscapes.

Fuente: Bennett & Sounders, en Sohdi & Ehrlich (2010), Conservation biology for all

Proceso de degradación del hábitat

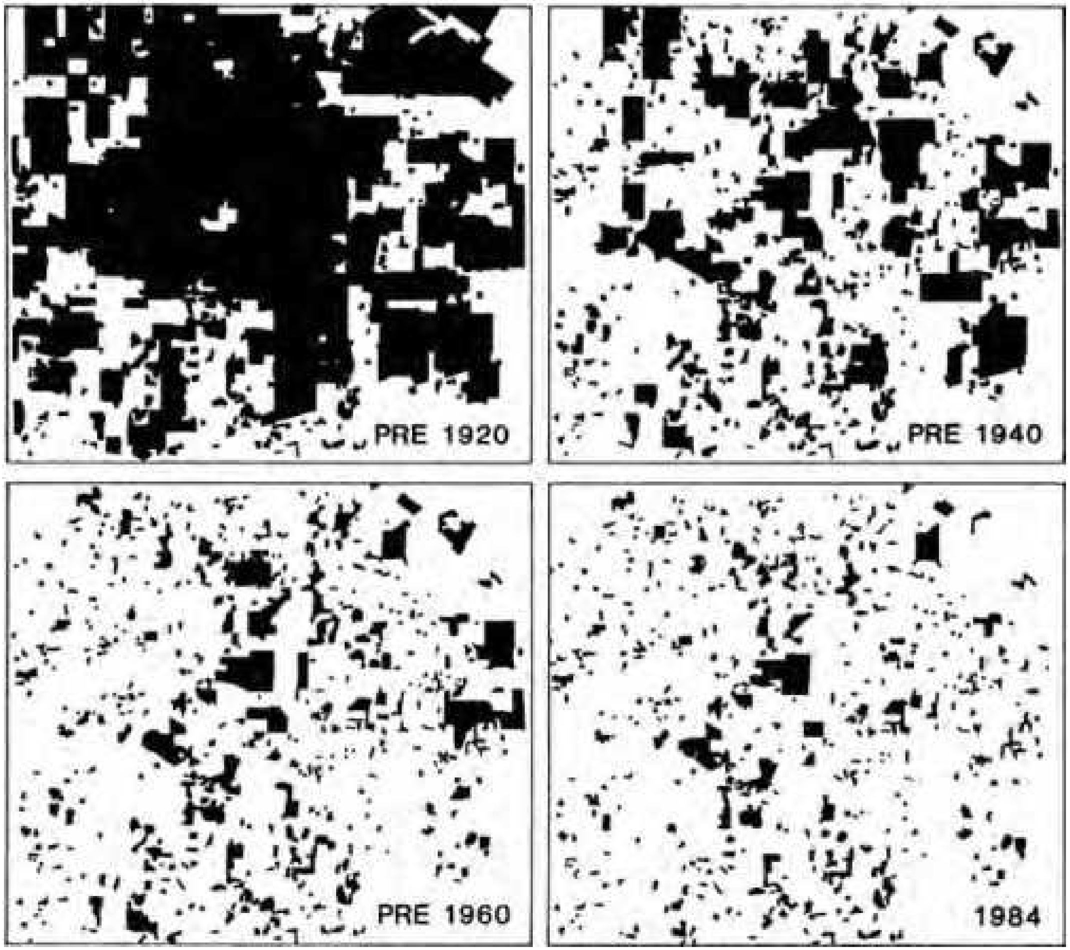
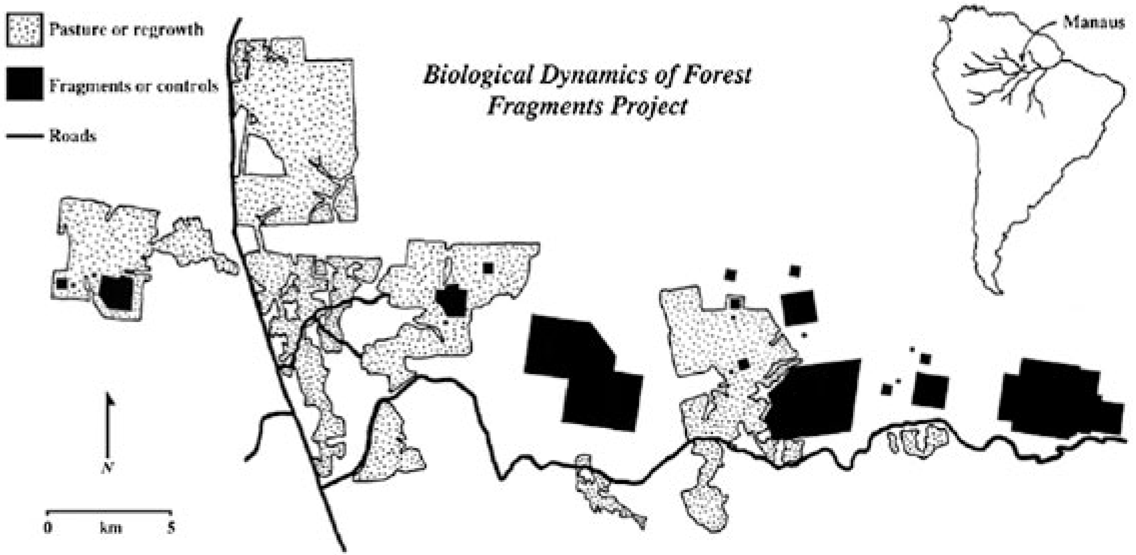


Figure 5.2 Changes in the extent and pattern of native vegetation in the Kellerberrin area, Western Australia, from 1920 to 1984, illustrating the process of habitat loss and fragmentation. Reprinted from Saunders *et al.* (1993).

Fuente: Bennett & Sounders, en Sohdi & Ehrlich (2010), Conservation biology for all

Experimentos de fragmentación



Map of the site of the The Biological Dynamics of Forest Fragments Project (BDFFP). Map courtesy of: W.F. Laurance et al. / Biological Conservation 144 (2011) 56–67.

Experimentos de fragmentación

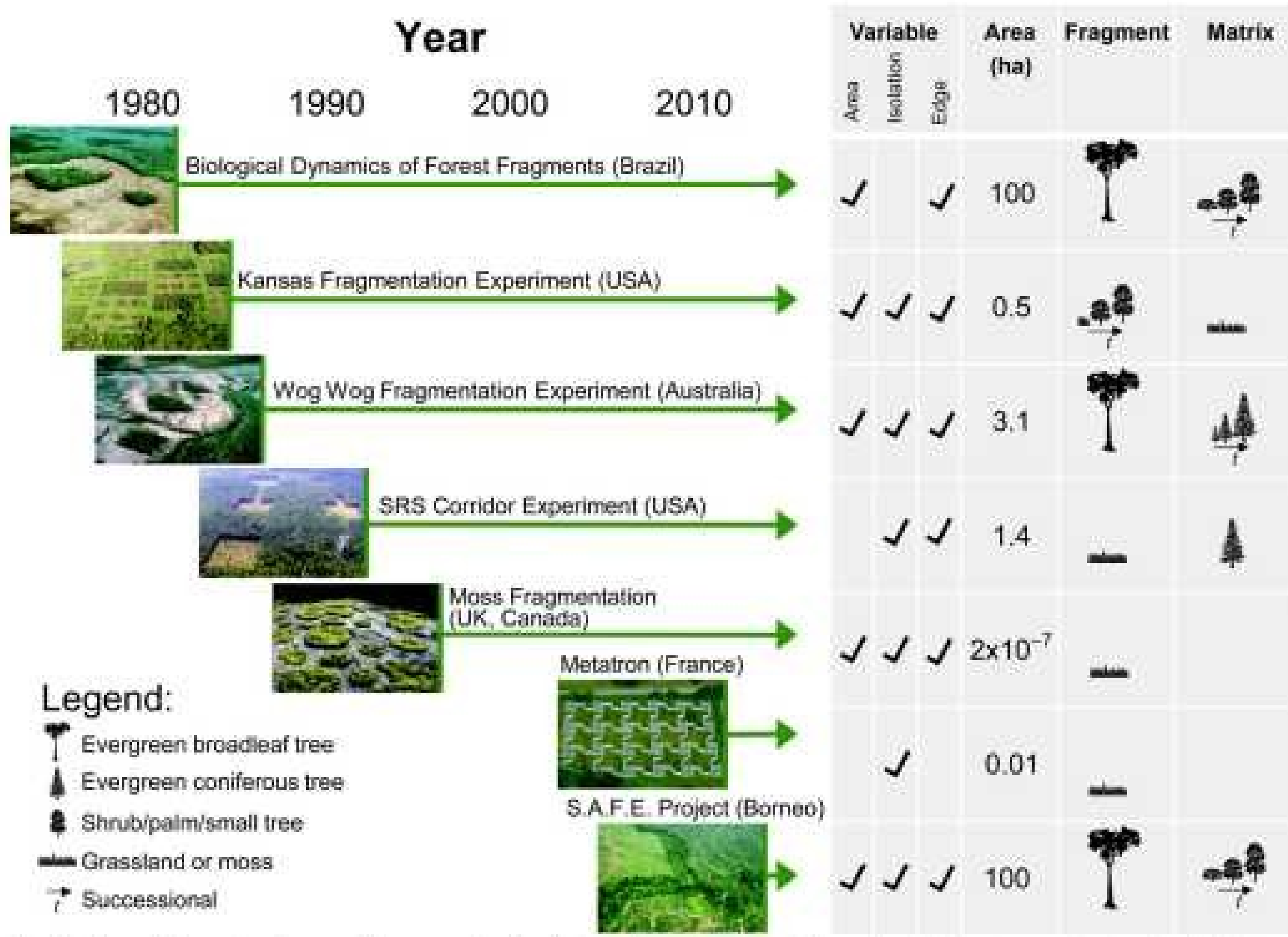


Fig. 2. The world's ongoing fragmentation experiments. All experiments have been running continuously since the time indicated by the start of the associated arrow (with the exception of the moss fragmentation experiment, which represents a series of studies over nearly two decades). The variables under study in each experiment are checked. The area is that of the experiment's largest fragments. Icons under "Fragment" and "Matrix" indicate the dominant community and its relative height, with multiple trees representing succession.

Haddad et al. (2015) Science Advances 1: e1500052

Experimentos de fragmentación

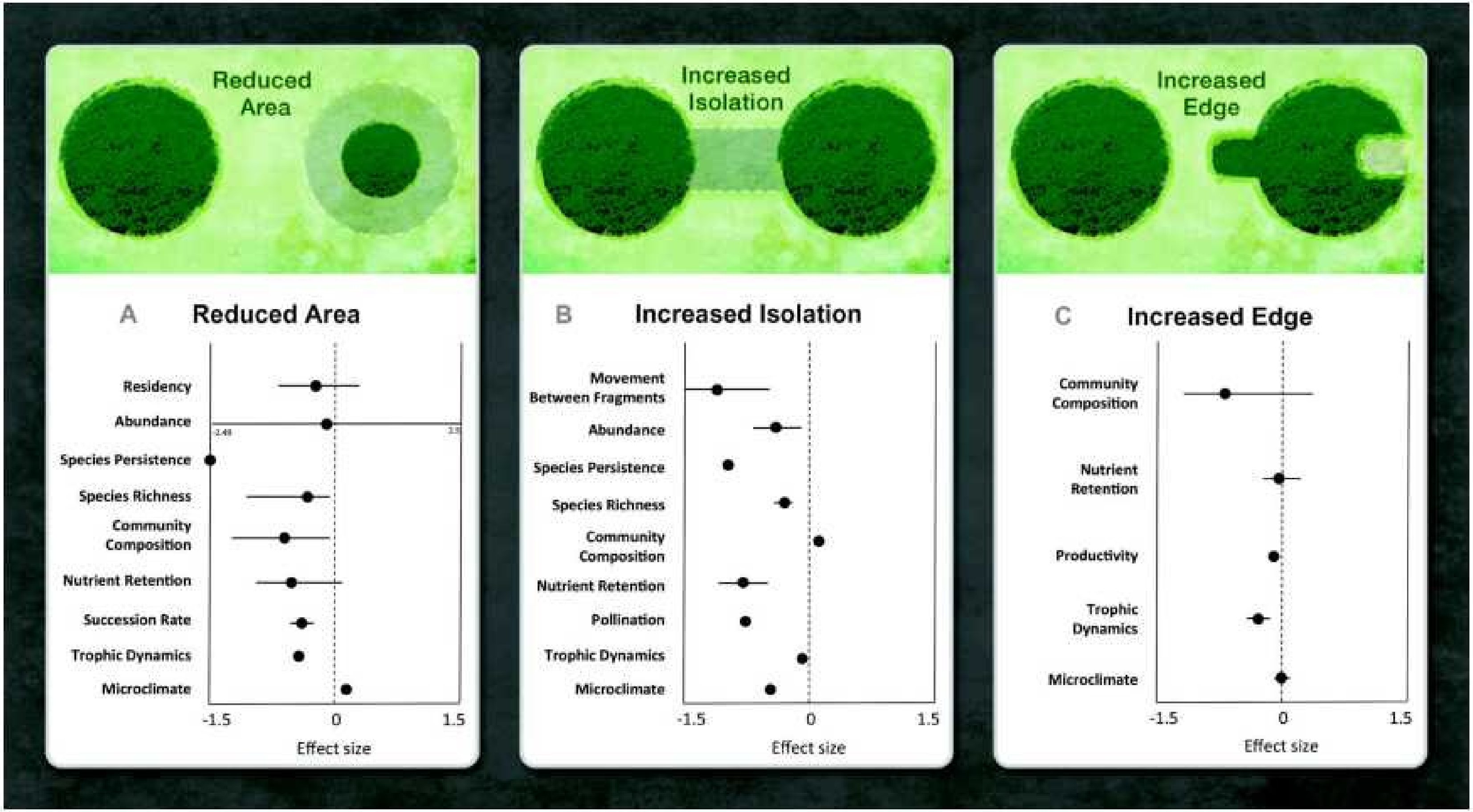


Fig. 3. Fragmentation effects propagate through the whole ecosystem. (**A** to **C**) For each fragmentation treatment [reduced area in BDFFP, Wog Wog, Kansas (A); increased isolation in SRS and Moss (B); and increased edge in all experiments (C)], we summarize major findings for ecological processes at all levels of ecological organization. Each dot represents the mean effect size [computed as log response ratio: ln(mean in more fragmented treatment/mean in non- or less-fragmented treatment)] for an ecological process. Effect sizes are statistical, such that negative or positive values could represent degrading function. Horizontal bars are the range when a dot is represented by more than one study. Details, including individual effect sizes for each study, are reported in table S1.

Haddad et al. (2015) Science Advances 1: e1500052

Efecto del área

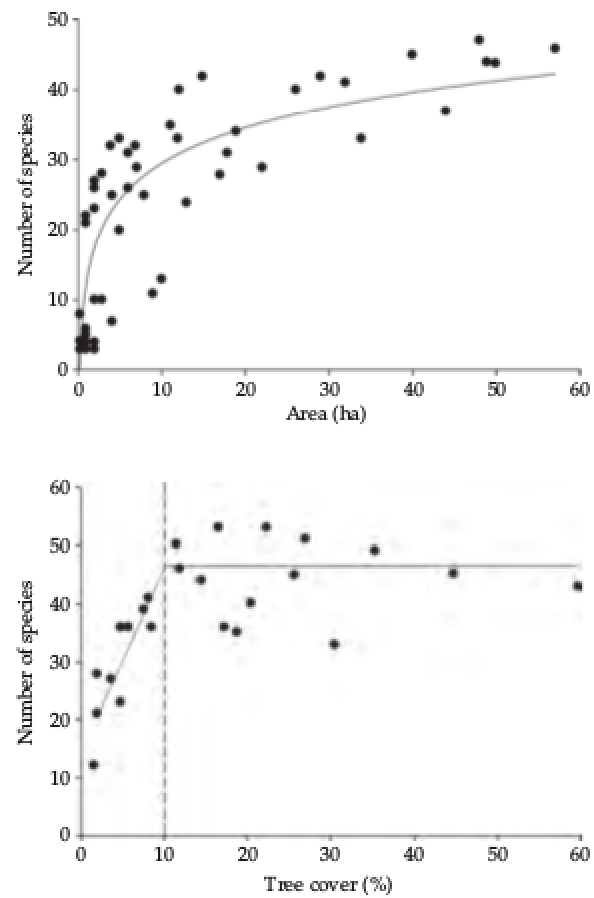


Figure 5.6 Species-area relationships for forest birds: a) in forest fragments of different sizes in eastern Victoria, Australia (data from Loyn 1997); b) in 24 landscapes (each 100 km^2) with differing extent of remnant wooded vegetation, in central Victoria, Australia (data from Radford *et al.* 2005). The piecewise regression highlights a threshold response of species richness to total extent of wooded cover.

Fuente: Bennett & Sounders, en Sohdi & Ehrlich (2010), Conservation biology for all

Efecto del área

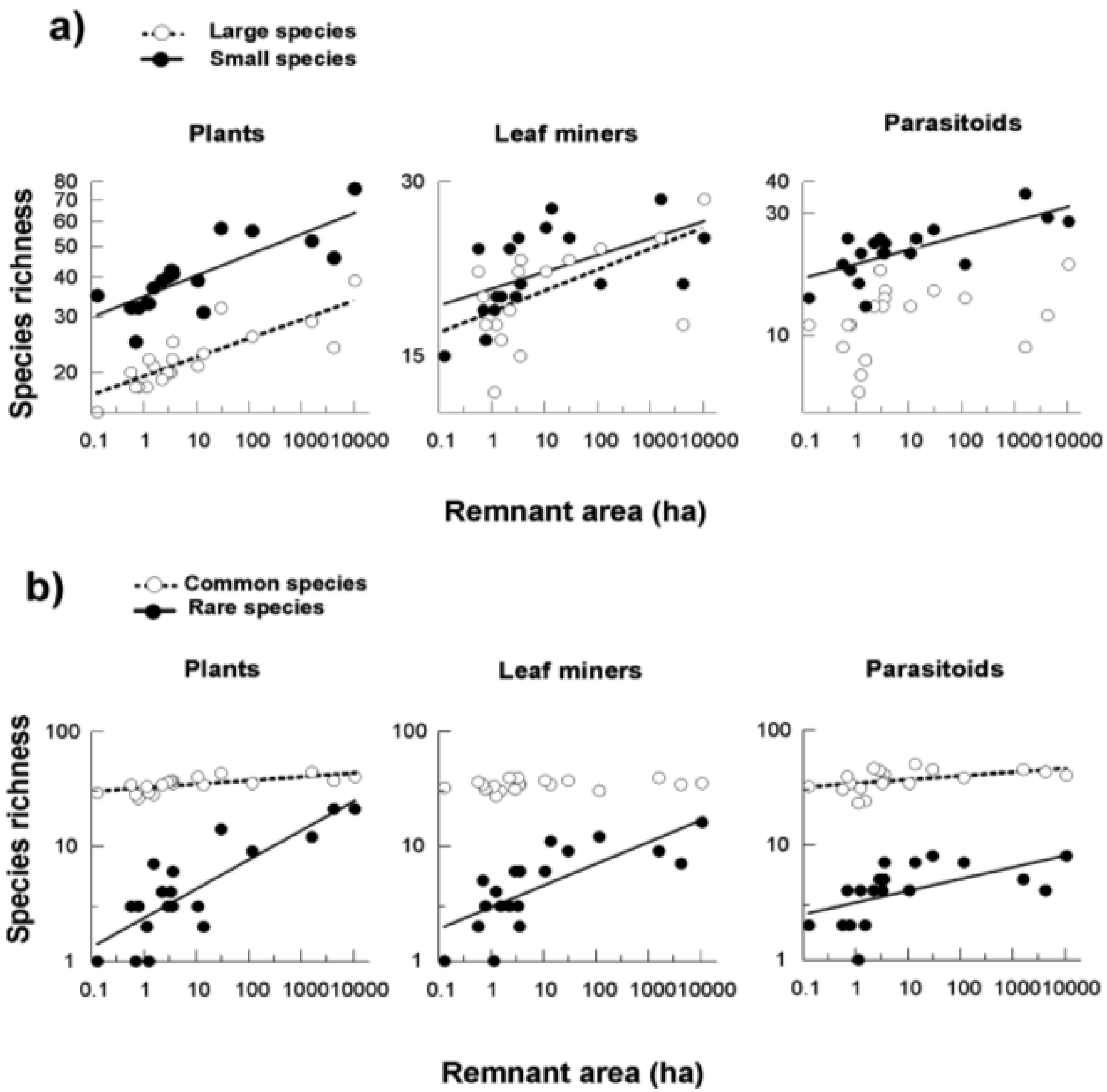


Figure 1. Species–area relationships for (a) large and small and (b) rare and common plants, leaf miners, and parasitoids in 19 Chaco Serrano remnants (Argentina).

Fuente: Cagnolo et al. (2009) Cons. Biol. 23: 1167-1175

Aislamiento

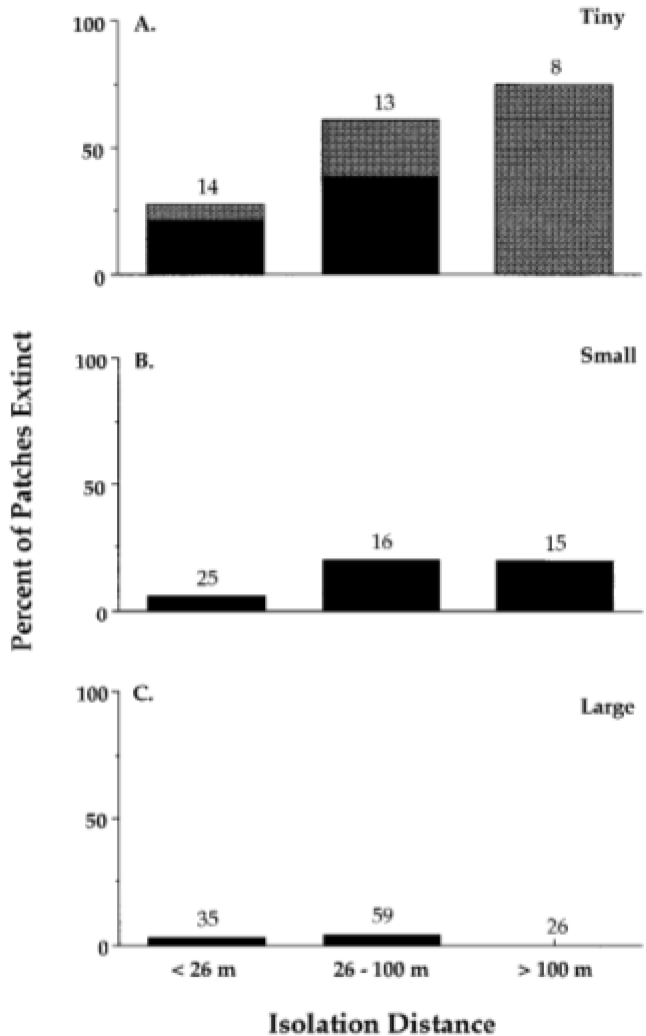


Figure 4: Percent of patches extinct after 5 yr as a function of isolation distance and patch size. Those patches that went extinct due to a catastrophe are shown in black, those driven extinct via inadequate reproductive success and other demographic factors are shown in gray. Tiny = one to 10 plants, small = 11–50 plants, large = >50 plants. Total number of patches in each category is given above each bar.

Fuente: Groom (1998) Am. Nat. 151: 487-496

Efecto borde

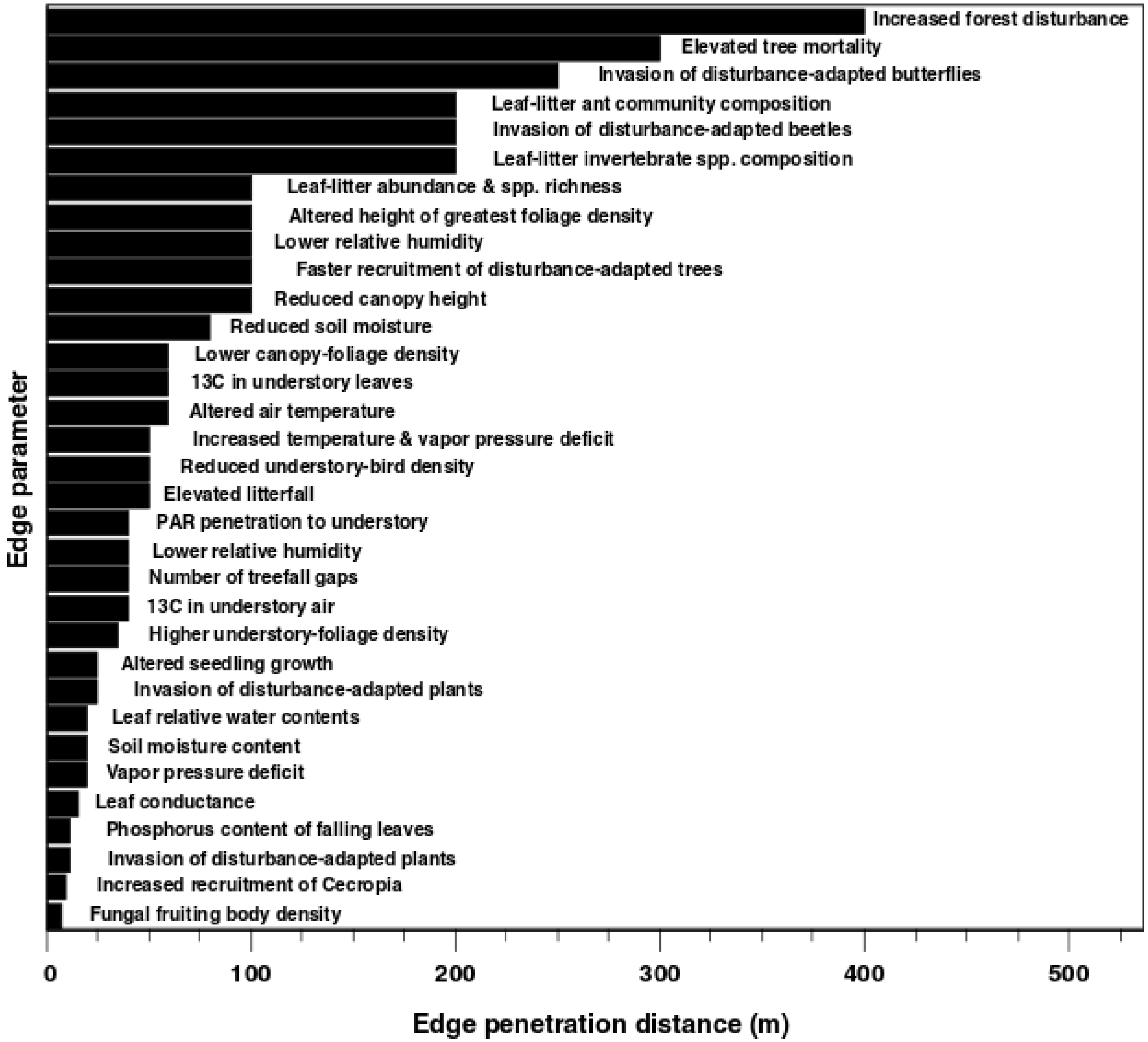


Fig. 3 – Edge effects documented in Amazonian forest fragments, showing the great diversity of edge phenomena and the varying distances they penetrate into forest interiors (after Laurance et al., 2002).

Fuente: Laurance (2008) Biol. Cons. 141: 1731-1744

Efecto borde

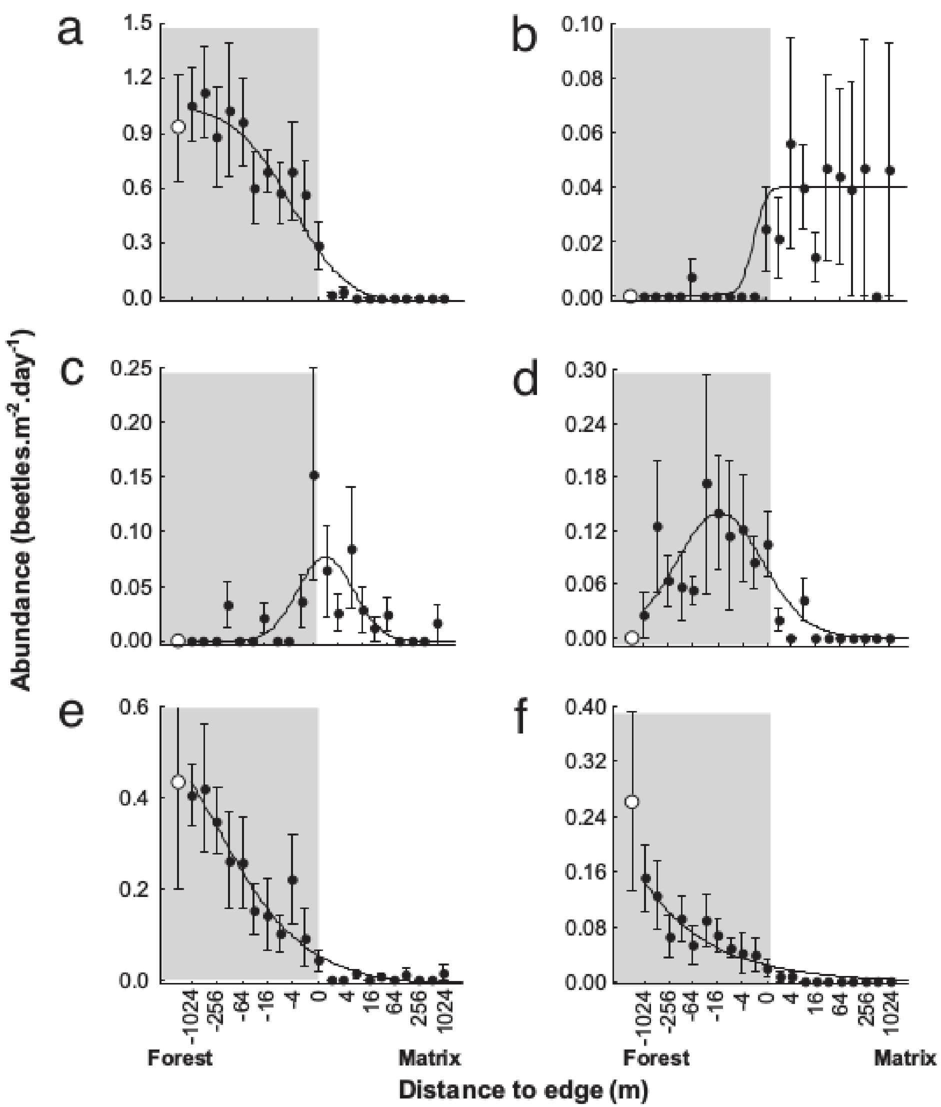


Fig. 2. Change in abundance of six beetle species across forest edges in New Zealand. Example species with a preference for forest habitat (*a*, *e*, and *f*), grassland matrix habitat (*b*), and edge habitat (*c* and *d*) are presented. For *a–c* there is an asymptote in beetle abundance inside the forest, so it is possible to calculate the distance over which the habitat edge influences abundance, which in the examples illustrated is −28, −1, and −6 m, respectively (calculated as the local maxima or minima of the second derivatives of the fitted curves; *SI Appendix*) (8). However, in *d–f* there is no statistical evidence for an asymptote inside the forest, indicating that abundance is still changing across the forest edge gradient and that edge effects penetrate as far as 1 km. Values are mean ± SE, and the open symbols represent the values for five sites in the deep forest control that were all separated by >500 m. These values are presented for comparison but were not used in model fitting. Negative edge values are in the forest (shaded area), and positive values are in the surrounding grassland matrix. Fitted lines are the best-fitting model chosen from five competing models (*SI Appendix*) (8). The species presented are as follows: *Enicmus* sp. (Latridiidae) (*a*), *Sepedophilus* sp. (Staphylinidae) (*b*), *Scraptogetus* sp. (Aderidae) (*c*), *Nestrius* sp. (Curculionidae) (*d*), *Micrambina* sp. (Cryptophagidae) (*e*), and *Melanophthalma fulgurita* (Latridiidae) (*f*).

Fuente: Ewers & Didham (2008) PNAS 105: 5426-5429

Deuda de extinción

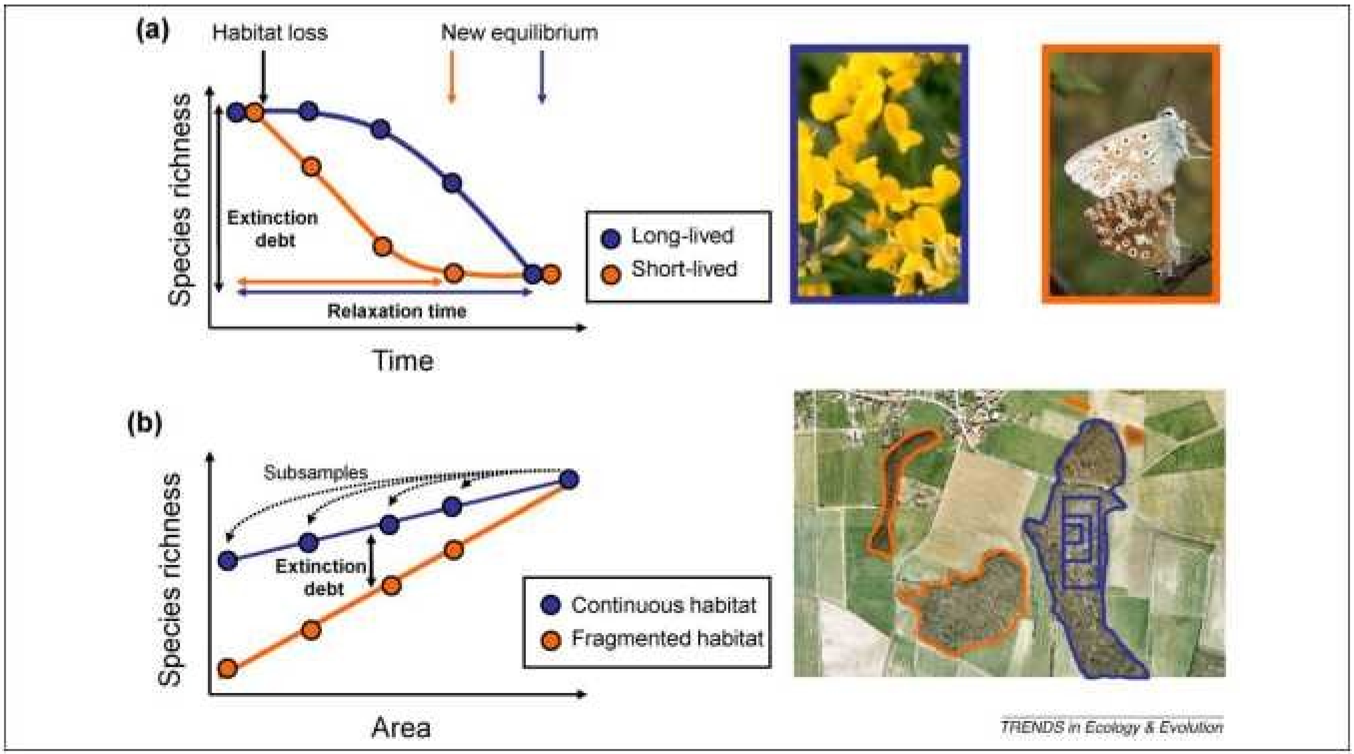


Figure 1. Conceptual model of extinction debt. (a) At equilibrium, species richness in a habitat patch is high. After an environmental perturbation, habitat is lost but this does not necessarily cause immediate extinction of all species to reach a new equilibrium. The difference between the number of species remaining after habitat loss and a new theoretical equilibrium represents a possible extinction debt. Relaxation time is the time elapsed since the habitat was lost until the new equilibrium is attained. Short-lived species (orange dots) are likely to show faster relaxation to a new equilibrium than long-lived species (blue dots). The photographs on the right-hand side are examples of a long-lived perennial herb (*Hippocrepis comosa*) and a short-lived butterfly species (*Polyommatus coridon*). (b) In a continuous habitat, subsamples of different areas show a shallower species–area relationship (blue dots) than those in a fragmented habitat (orange dots). The difference in species numbers between large and small subsamples provides an estimate of the deterministic species loss in the initial phase of habitat loss. In fragmented habitats, several of the initially surviving species will not be able to persist in the long term and thus there is an extinction debt. In a later equilibrium stage, such isolated fragments show steeper species–area relationships (orange dots) than non-fragmented areas of the same size (blue dots). Immediately after perturbation, extinction debt is proportionally higher in small patches (as shown in the figure). Since patch-level extinctions tend to occur faster in small patches, after some time the remaining extinction debt can be higher in large patches. The aerial photograph on the right-hand side illustrates the sampling of different sized areas in a continuous forest (blue patches) versus sampling in smaller and larger isolated forest fragments (orange patches). Both axes are on a log scale.

Fuente: Kuusaari et al. (2009) Trends Ecol Evol 24: 564-571

Deuda de extinción

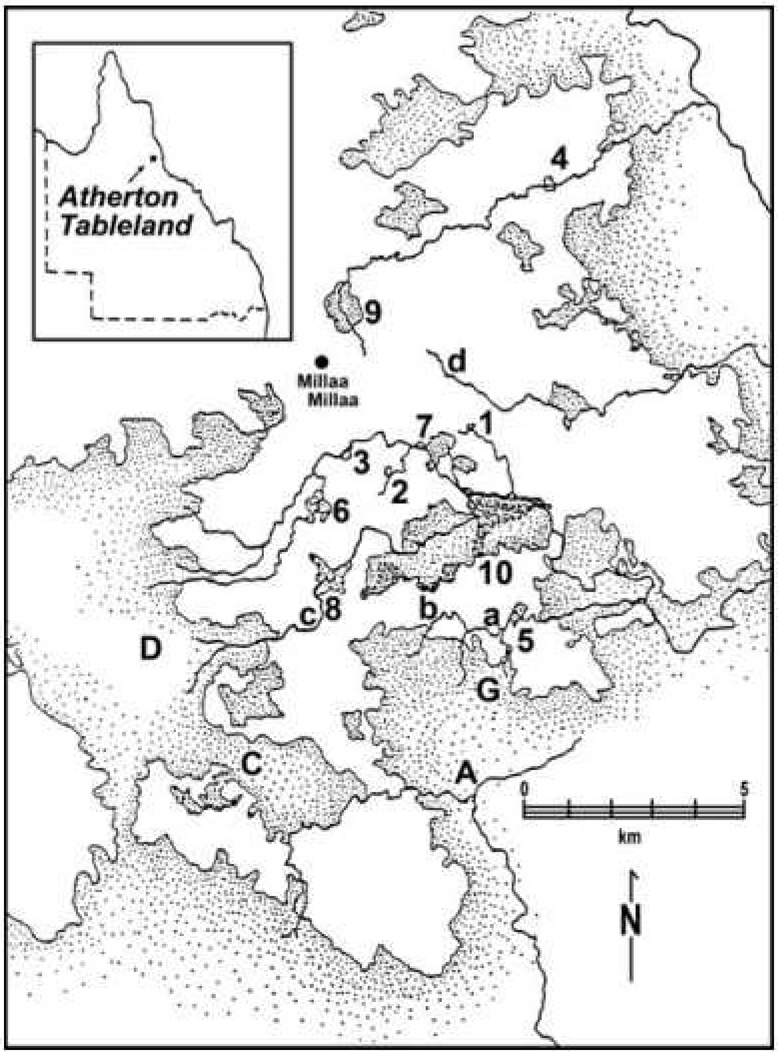


Figure 1. Map of study area in north Queensland in 2006–2007. Four control sites in intact forest are A, C, D, and G; 10 forest fragments ranging from 1.4 to 590 ha in area are numbers 1–10; and 4 regrowth "corridors" along streams are a–d.

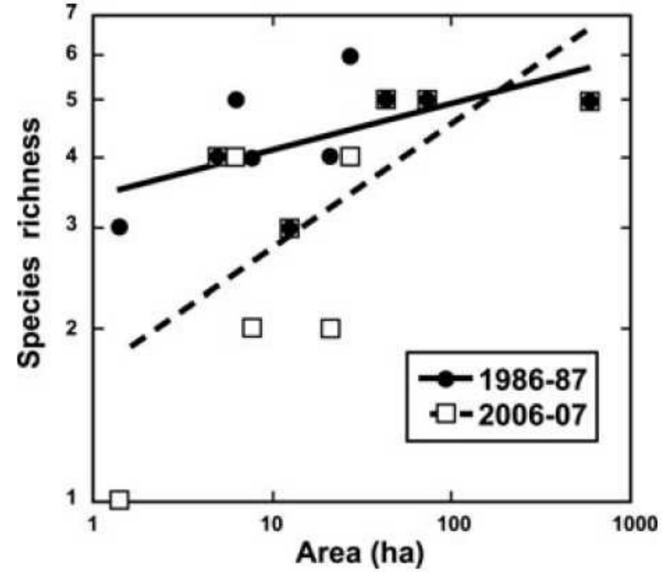


Figure 3. Species-area relationships for mammals in rainforest fragments in tropical Queensland; contrasting patterns in 1986–1987 (species = 3.40 area$^{0.08}$) and 2006–2007 (species = 1.67area$^{0.22}$).

Fuente: Laurance et al. (2008) Conservation Biology 22: 1154-1164

Deuda de extinción

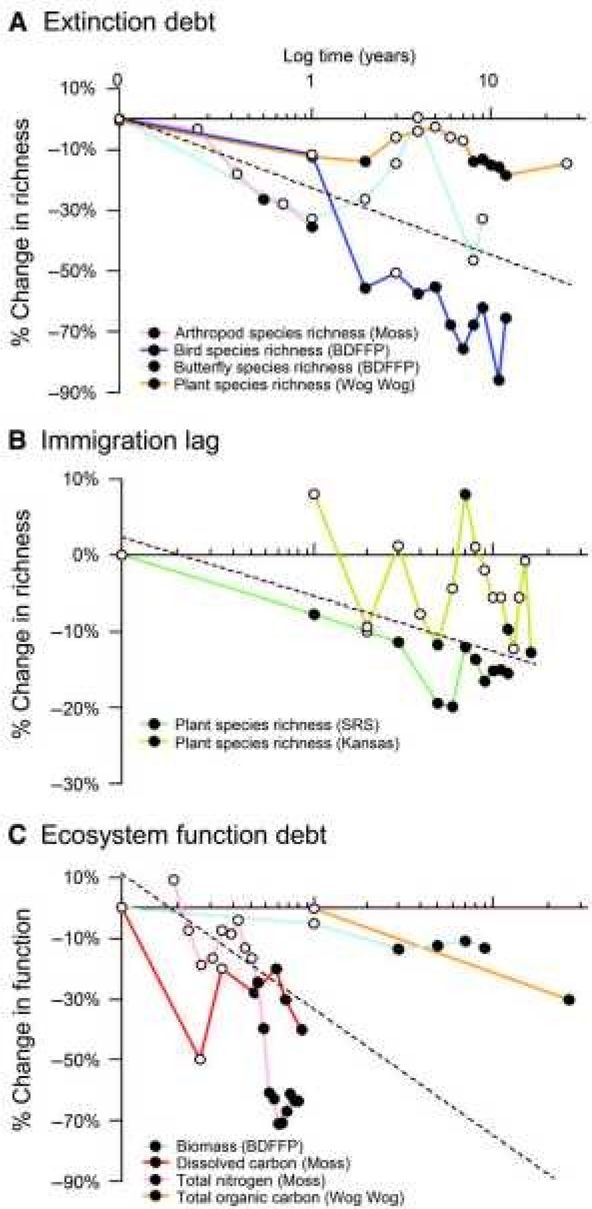


Fig. 4. Delayed effects of fragmentation on ecosystem degradation. (**A**) The extinction debt represents a delayed loss of species due to fragmentation. (**B**) The immigration lag represents differences in species richness caused by smaller fragment area or increased isolation during fragment succession. (**C**) The ecosystem function debt represents delayed changes in ecosystem function due to reduced fragment size or increased isolation. Percent loss is calculated as proportional change in fragmented treatments [for example, (no. of species in fragment − no. of species in control)/(no. of species in control) × 100]. Fragments and controls were either the same area before and after fragmentation, fragments compared to unfragmented controls, or small compared to large fragments. Filled symbols indicate times when fragmentation effects became significant, as determined by the original studies (see table S2). Mean slopes (dashed lines) were estimated using linear mixed (random slopes) models. Mean slope estimates (mean and SE) were as follows: (A) −0.22935 (0.07529); (B) −0.06519 (0.03495); (C) −0.38568 (0.16010).

Haddad et al. (2015) Science Advances 1: e1500052

¿Es buena la fragmentación?

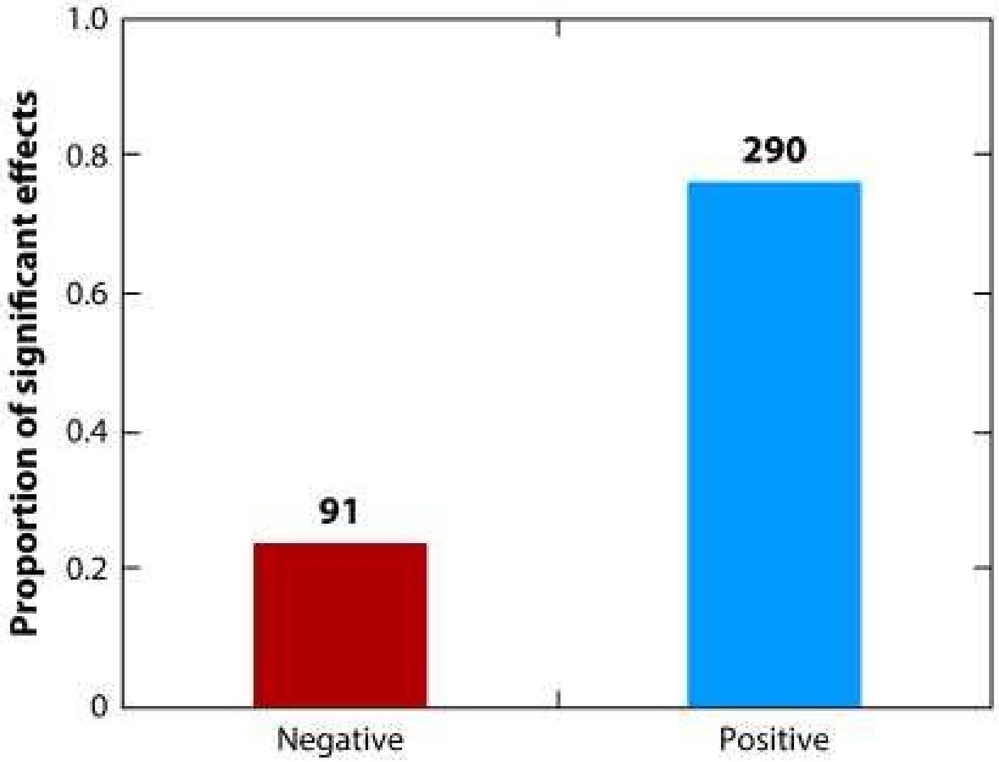


Figure 8

Proportion of significant fragmentation effects that are negative and positive, across all ecological responses. Numbers above the bars indicate the number of significant effects. Most significant fragmentation effects are positive.

Fuente: Fahrig (2017) Ann. Rev. Ecol., Evol. & Syst. 48: 1-23

¿Es buena la fragmentación?

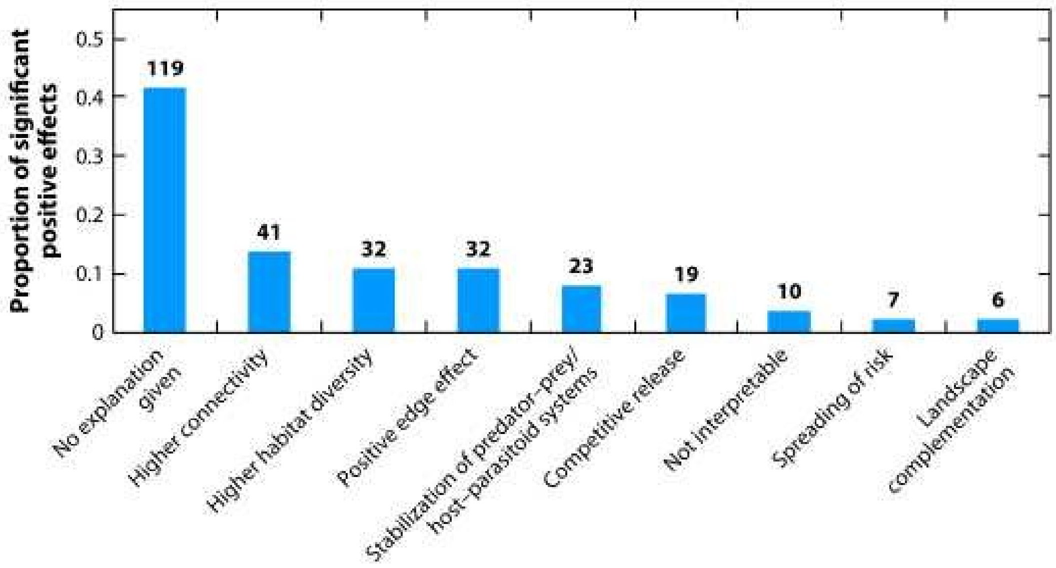


Figure 12

Explanations offered by the authors for their significant positive effects of fragmentation. Numbers above the bars indicate the number of significant effects. No explanation was suggested for 41% of significant positive fragmentation effects. Several authors suggested that landscapes with more small patches (i.e., more fragmented landscapes) had higher functional connectivity and/or higher habitat diversity than landscapes with fewer large patches. Some authors explained their positive fragmentation effects as resulting from positive edge effects such as higher survival and/or higher reproductive success at habitat edges. Other authors suggested that positive fragmentation effects are due to stabilization of predator–prey or host–parasitoid interactions or reduced intra- or interspecific competition in more fragmented landscapes. Some authors suggested that extinction risk is lower in more fragmented landscapes owing to the spreading of risk over multiple patches. Finally, a few authors suggested that habitat fragmentation increases landscape complementation by increasing accessibility among multiple required habitat types. For 10 responses the author offered an explanation for their significant positive fragmentation effect(s), but I was not able to interpret this explanation as a mechanism that could produce a positive fragmentation effect. Most of the explanations proposed by authors for their positive fragmentation effects have been present in the ecological literature for more than 40 years.

Fuente: Fahrig (2017) Ann. Rev. Ecol., Evol. & Syst. 48: 1-23

¿Es buena la fragmentación?

So-called zombie ideas are ideas that should be dead but are not (Fox 2011). The results of this review suggest that the idea that habitat fragmentation, independent of habitat loss, has widespread negative effects on ecological responses qualifies as a zombie idea. It arose from (*a*) confounding habitat patchiness with habitat loss (see Section 1) and (*b*) inappropriate extrapolation of patch-scale patterns to landscape-scale inferences. The fact that this zombie has persisted for more than 45 years is a testament to its intuitive appeal (Fahrig 2017).

most authors still assume that the effects of habitat fragmentation independent of the effects of habitat loss are generally negative, as evidenced by the following statements: "Habitat loss and fragmentation are major threats to terrestrial biodiversity" (Prugh et al. 2008, p. 20770), "habitat loss and fragmentation are the principal causes of the loss of biological diversity" (Mbora & McPeek 2009, p. 210), "habitat loss and fragmentation cause significant loss of species richness" (Barth et al. 2015, p. 122), and "habitat loss and fragmentation inevitably cause biodiversity decline" (Barelli et al. 2015, p. 23).

The results of this review indicate that such statements are in fact false. Although habitat loss is, without doubt, one of the most significant causes of biodiversity decline, the significant responses to habitat fragmentation independent of habitat amount are rare and mostly positive.

Fuente: Fahrig (2017) Ann. Rev. Ecol., Evol. & Syst. 48: 1-23

¿Es buena la fragmentación?

Table 1

Major conclusions regarding 'zombie ideas' in Fahrig (2017), the evidence provided, and a non-exhaustive summary of counter evidence not considered in the review (focusing on meta-analyses, systematic reviews, and prior rebuttals).

Fahrig's 'zombie ideas'	Fahrig's evidence	Counter evidence not considered
Habitat fragmentation has widespread negative effects	76% of 'significant' responses to habitat fragmentation from landscape studies were positive.	Haddad et al. (2015) provide a meta-analysis on long-term, patch-focused experiments, with edge and isolation effects controlling for habitat area and habitat heterogeneity. Effects are consistently negative (80% isolation; 82% edge) and increasingly so over time.
Small number of large patches contain more species than large number of small patches	SLOSS[a] analysis on species richness: all 60 'significant' responses were positive (higher richness in many small patches).	Ramsey (1989) and Mac Nally and Lake (1999) argue that this type analysis is flawed, yielding biased results (in the direction shown by Fahrig), and that it does not provide a means of assessing 'significance'.
Edge effects are generally negative	No data. Authors of papers suggest that positive edge effects may drive positive responses to habitat fragmentation.	Ries et al. (2004), Fletcher Jr. et al. (2007), and Pfeifer et al. (2017) show variable edge effects. Pfeifer et al. (2017) meta-analysis shows that species with negative edge effects are 3.7 times more likely to be of conservation concern (IUCN threatened), while positive responses include pest/invasive species.
Habitat fragmentation reduces connectivity	No data. Authors of papers suggest that greater functional connectivity may drive positive responses to habitat fragmentation.	Meta-analysis on corridor effects shows positive effect of corridors (less fragmented), with 50% increase in movement (n = 28 studies) along corridors when controlling for habitat area (Gilbert-Norton et al., 2010).
Habitat specialists show greater negative responses	No data. Pooled 'endangered/threatened/specialist': 29 of 30 significant responses to habitat fragmentation were positive.	Pfeifer et al. (2017) meta-analysis shows that negative edge effects are typically observed for specialist species, positive for generalist species.
Negative habitat fragmentation responses are stronger at low levels of habitat amount	Proportion of negative responses to habitat fragmentation were similar when comparing < 0.2 (31%) habitat to > 0.2 (33%).	Theory emphasizes that specific thresholds are contingent on assumptions regarding movement (Swift and Hannon, 2010) (Hanski, 2015; With and King, 2001). Fahrig's results do not support this claim when considered a larger threshold: < 0.5 (33.3% negative) versus > 0.5 (8% negative).
Negative fragmentation responses are stronger in the tropics	Proportion positive responses similar for 'subtropical/tropical' versus other.	Lindell et al. (2007) meta-analysis shows that tropical birds are more likely to avoid edges than temperate birds.

[a] SLOSS analyses based on species accumulation curves. Only the lack of crossing accumulation curves was taken as 'significant', although Mac Nally and Lake (1999) show this conclusion provides no statistical inference on 'significance'.

Fuente: Fletcher et al. (2018) Biological Conservation 226: 9-15

¿Es buena la fragmentación?

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Fahrig's review provides insufficient evidence or context for the conclusion that habitat fragmentation effects are largely positive. Such a conclusion is only possible with an unreasonable set of assumptions that narrows the evidence base. We caution that fueling polarized perspectives with invective can stymie research growth, and could have unintended and unjustified ramifications for conservation and management. The take-home message should be a call to all scientists working at the forefront of issues on habitat loss and fragmentation to more clearly discriminate the mechanisms via which they impact biodiversity and to consider mechanistic modeling in addition to the statistical and correlative approaches that have fueled the present disagreements. Understanding why and when these habitat fragmentation effects occur, how they interact with other human-induced changes, and under what situations fragmentation effects will be positive or negative will be essential for conserving biodiversity.

Fuente: Fletcher et al. (2018) Biological Conservation 226: 9-15

Conclusiones

- La pérdida y la degradación del hábitat es una de las principales amenazas a la biodiversidad.
- Las actividades humanas han destruido y degradado una gran proporción de los ecosistemas mundiales.
- Una forma común de degradación es la fragmentación, que afecta a la biodiversidad por efectos de pérdida de área, aumento del aislamiento, efectos borde y las características de la matriz.