



Insieme per
educare al
futuro



L'importanza delle foreste vetuste

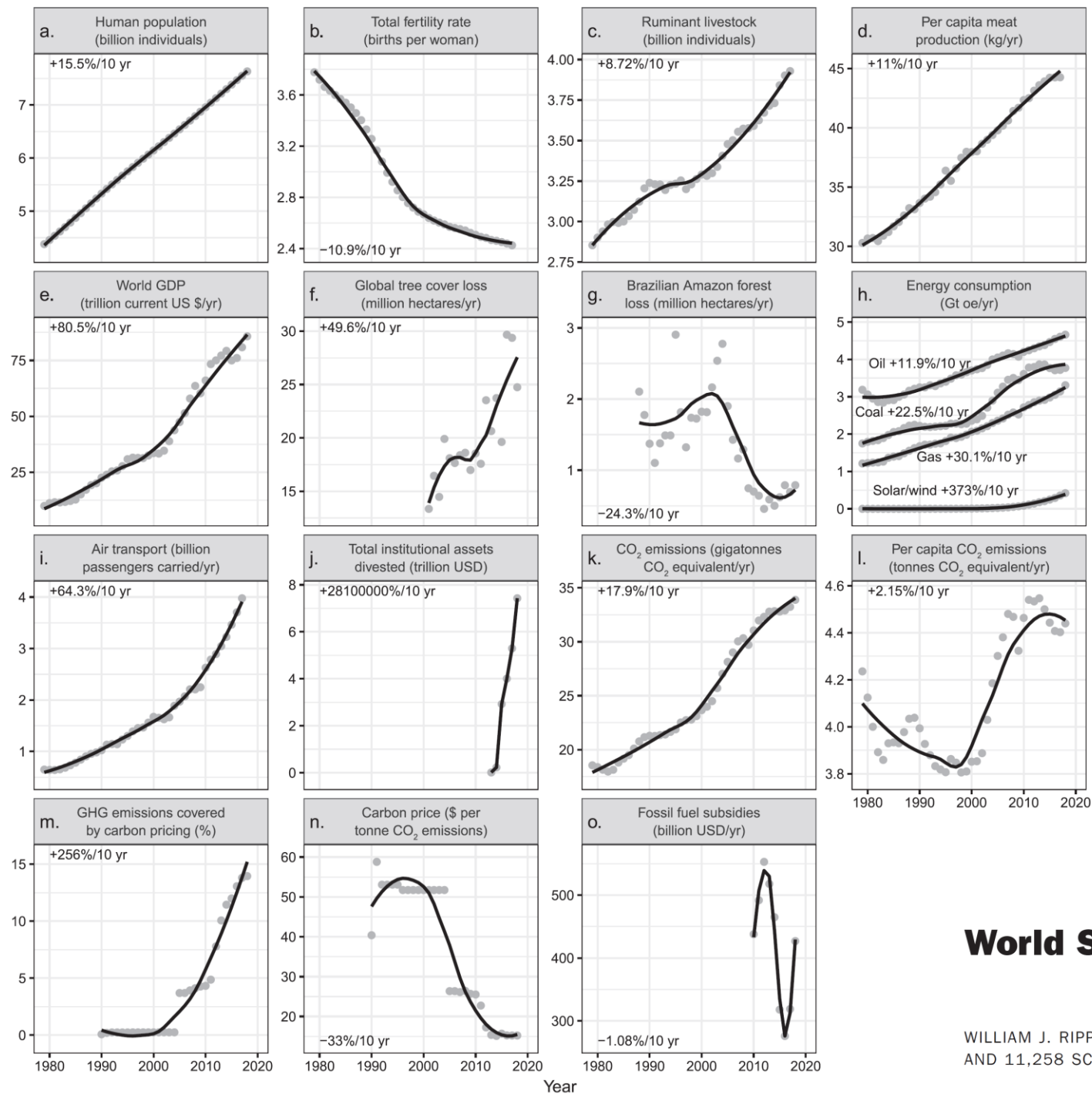
Alfredo Di Filippo, DAFNE-Università della Tuscia

27/05/2022 Monticiano (GR)

In collaborazione con
koinetica



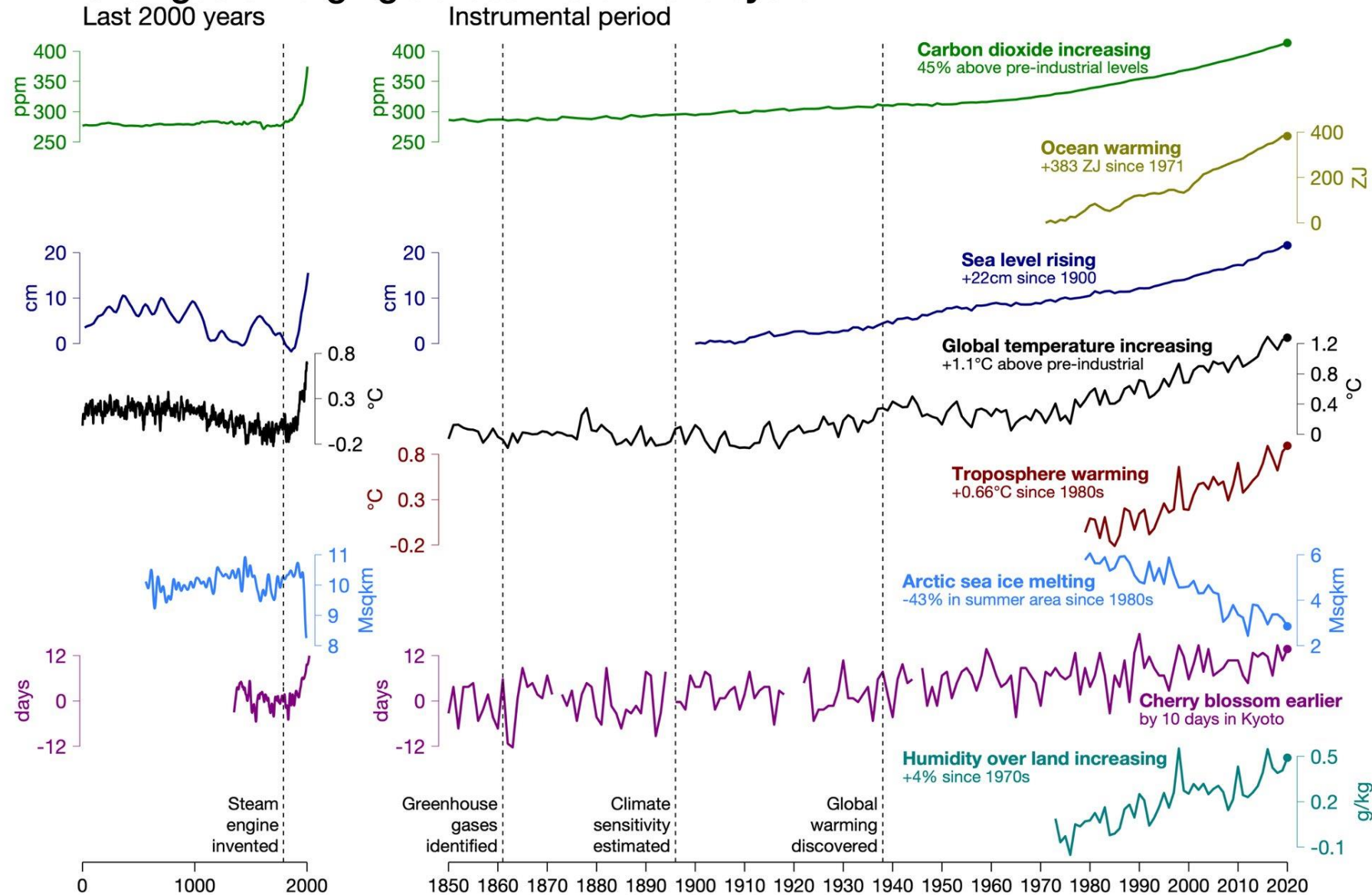
L'Antropocene



World Scientists' Warning of a Climate Emergency

WILLIAM J. RIPPLE, CHRISTOPHER WOLF, THOMAS M. NEWSOME, PHOEBE BARNARD, WILLIAM R. MOOMAW, AND 11,258 SCIENTIST SIGNATORIES FROM 153 COUNTRIES (LIST IN SUPPLEMENTAL FILE S1)

Changes emerging across the climate system

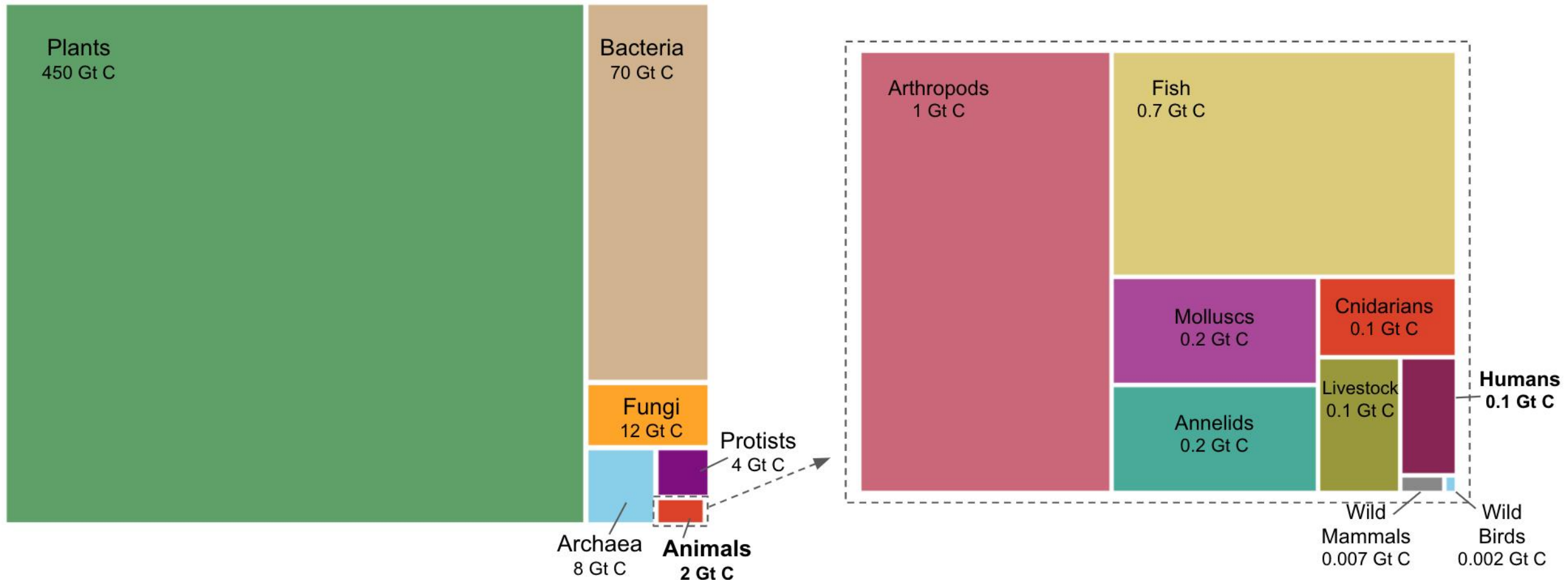


L'Antropocene



Biomass Distribution on Earth

Units: gigatons of carbon (Gt C)

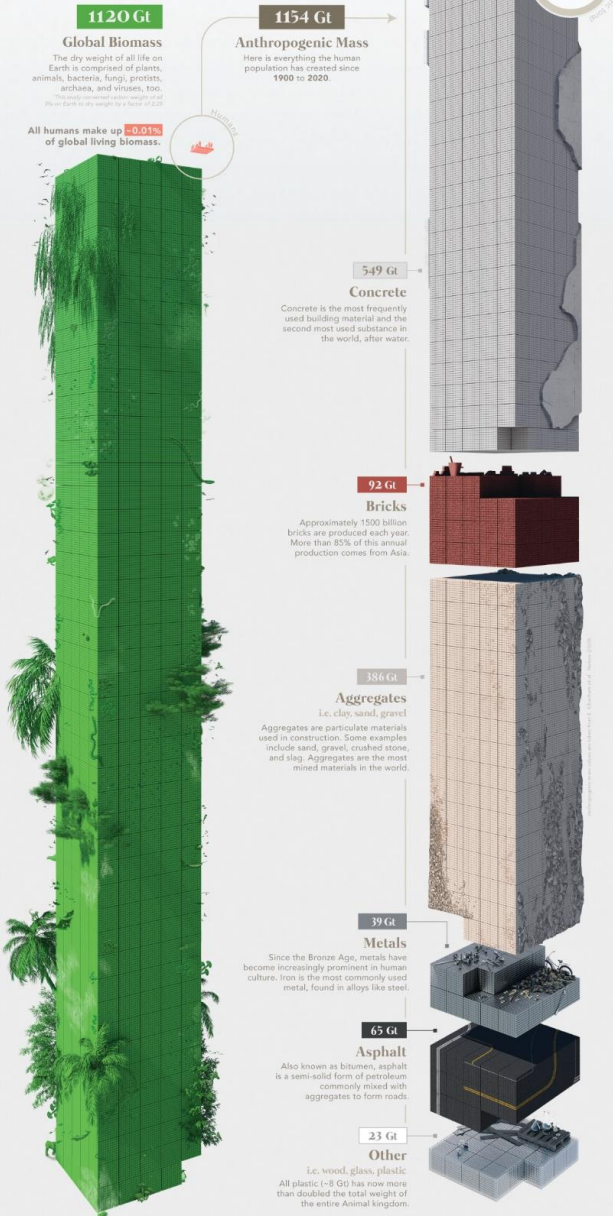


Visualizing the Scale of Anthropogenic Mass

Anthropogenic mass, or human-made mass, refers to the materials embedded within inanimate solid objects that are made by humans.

In 2020, the amount of anthropogenic mass exceeded the weight of **all global living biomass**.

As humans continue to dominate Earth, questions surrounding our material output are increasing. We break down the composition of all human-made materials and the rate of their production.

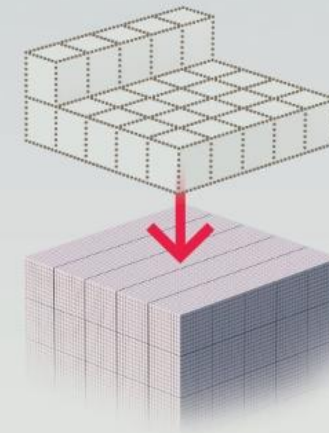


L'Antropocene

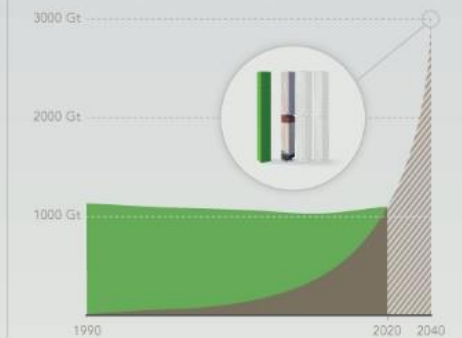
The Accumulation of Anthropogenic Mass

The current rate of accumulation for human-made mass is approximately **30 Gt of mass per year**.

This is equal to each person on Earth producing their own weight in human-made mass every week.



As accumulation rates increase, the amount of human-made mass is predicted to almost **triple the total amount of global living biomass** by 2040.



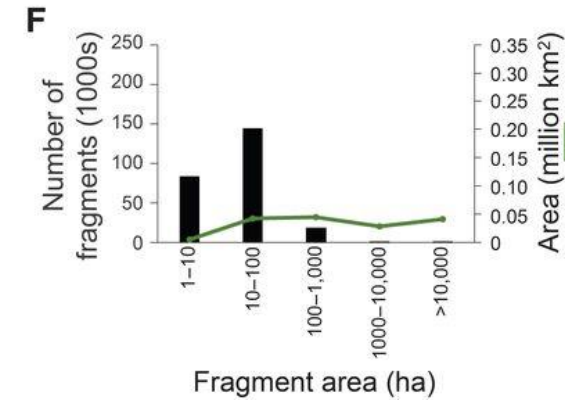
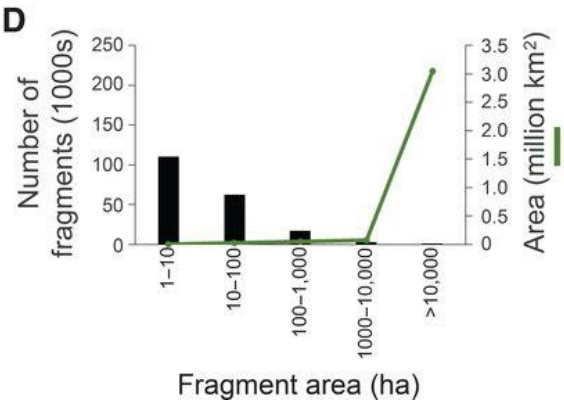
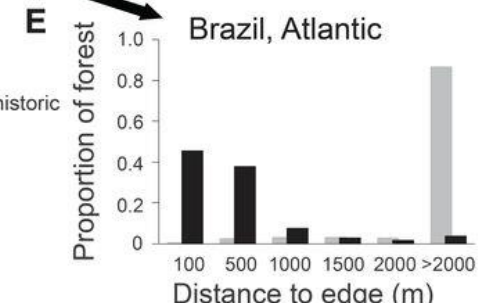
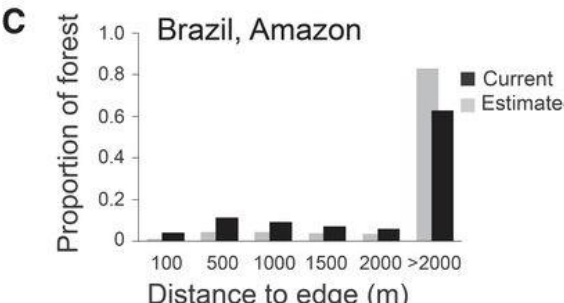
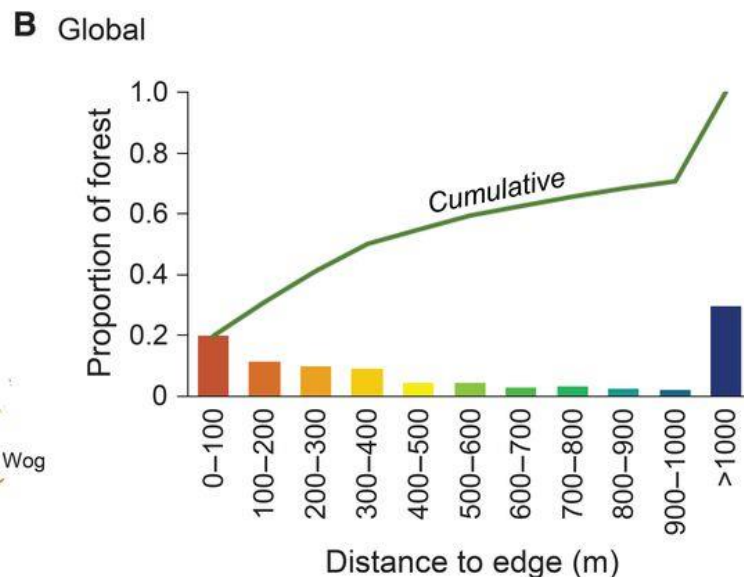
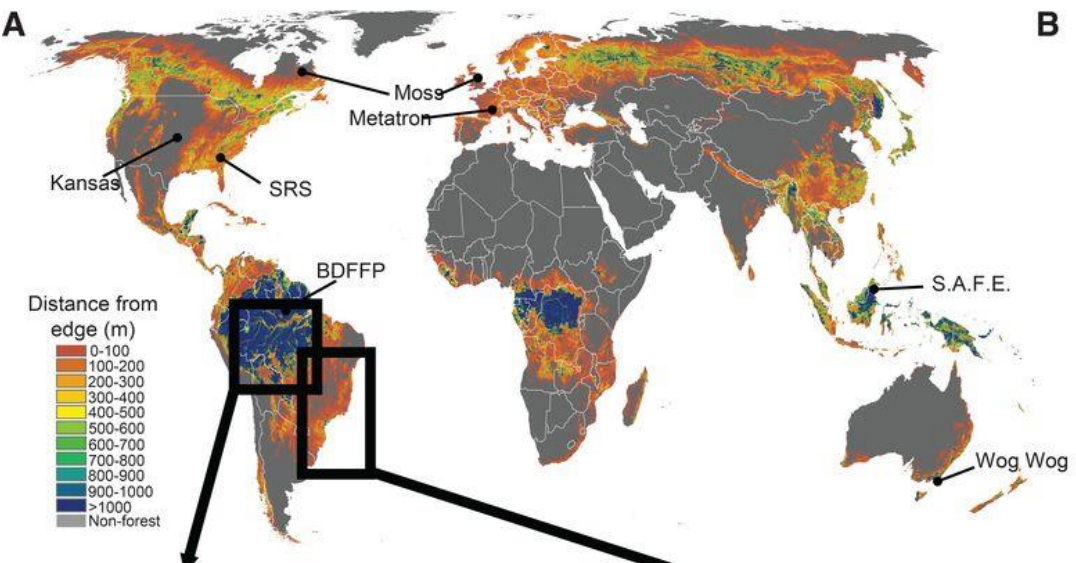
These trends highlight the alarming speed and volume in which human contributions are impacting the world.

SOURCE Elhachem, E., Ben Uri, E., Groszski, J., Bar-On, Y.M., Milo, R., 2020. Global human made mass exceeds all living biomass. *Nature* 588, 442-444. doi:10.1038/s41586-020-3010-5

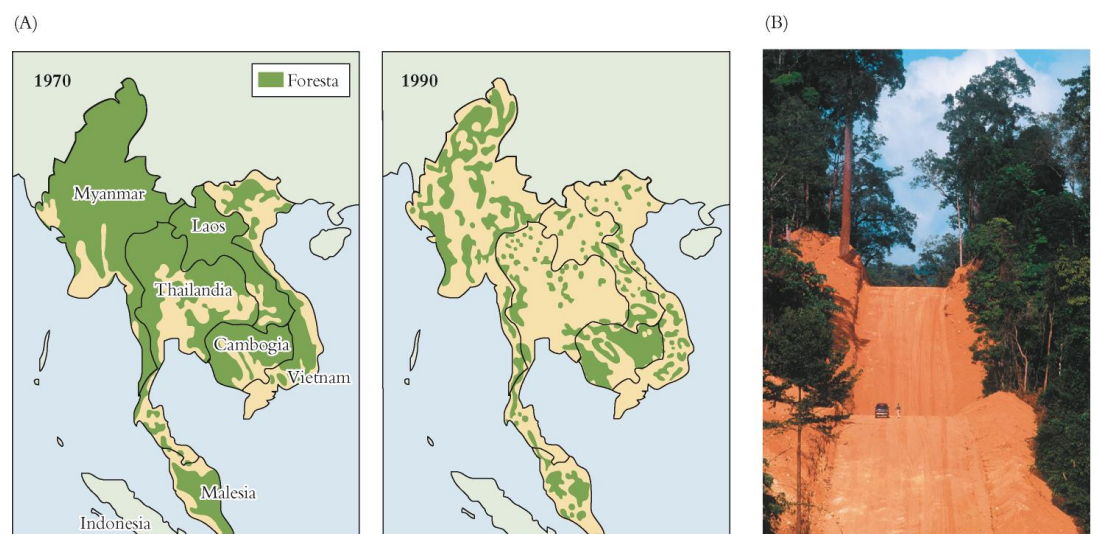


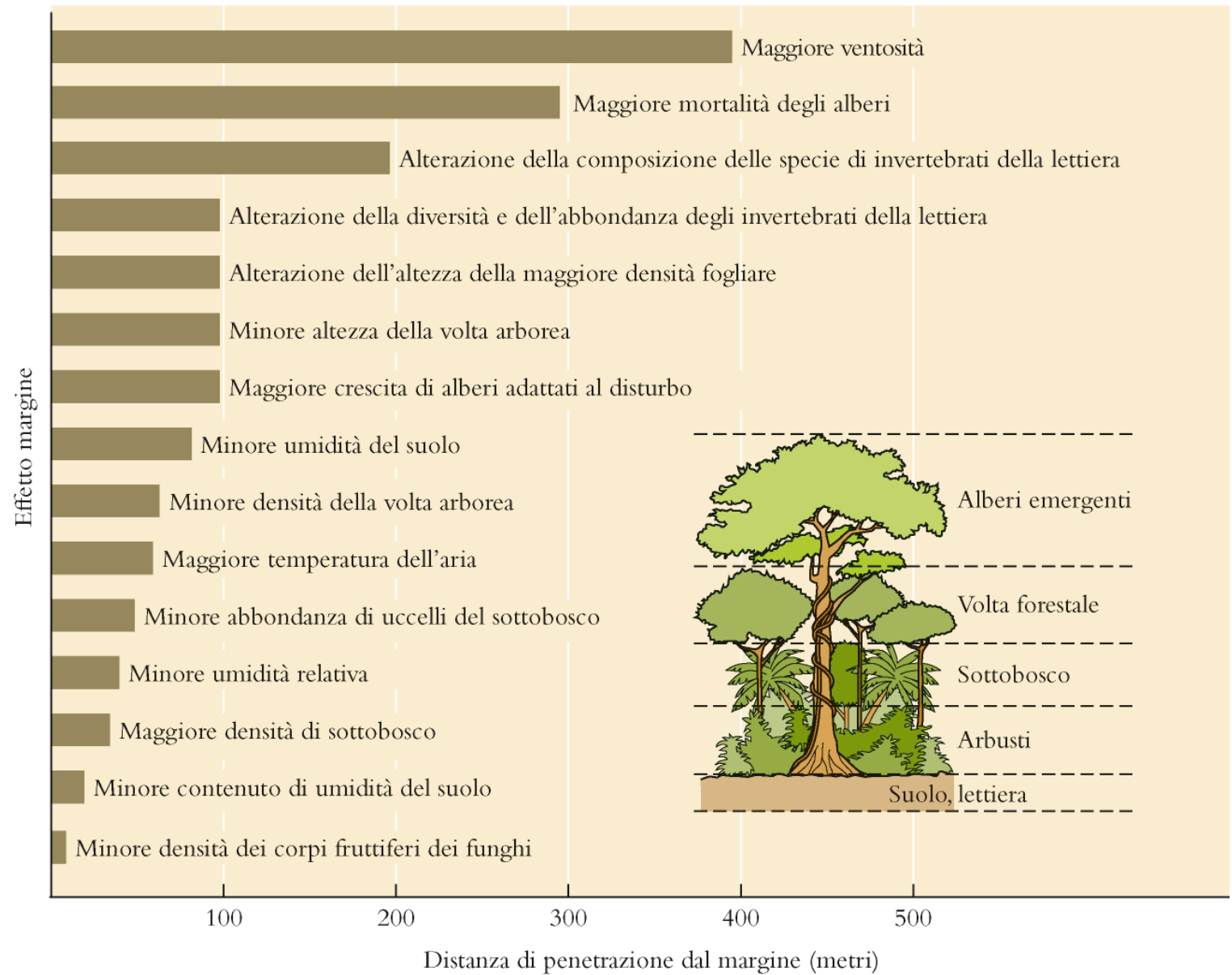
COLLABORATORS RESEARCH + WRITING Bruno Venditti | ART DIRECTION + DESIGN Mark Belan

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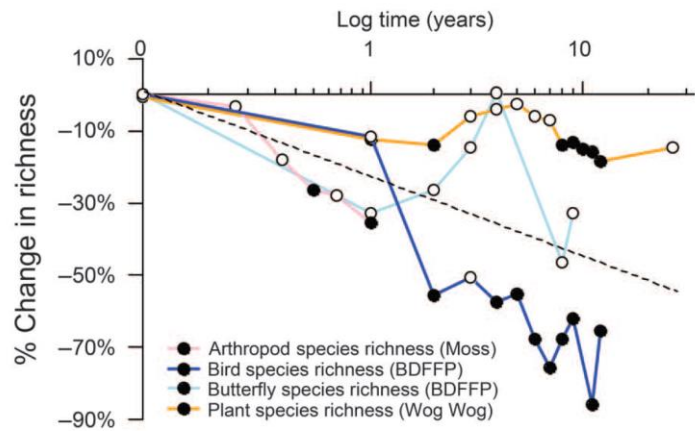
Frammentazione



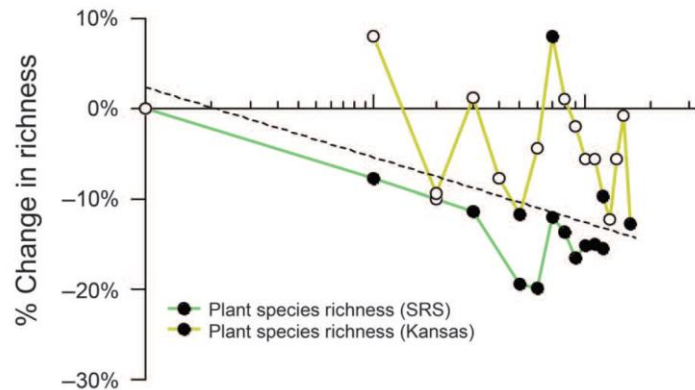


Frammentazione → Effetto Margine

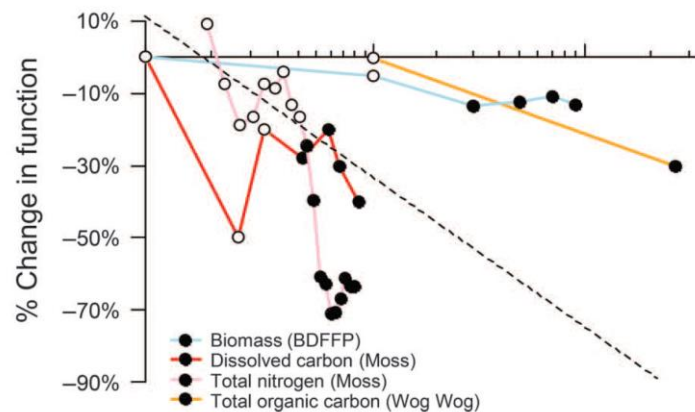
A Extinction debt



B Immigration lag



C Ecosystem function debt



Habitat fragmentation and its lasting impact on Earth's ecosystems

Nick M. Haddad,^{1*} Lars A. Brudvig,² Jean Clobert,³ Kendi F. Davies,⁴ Andrew Gonzalez,⁵ Robert D. Holt,⁶ Thomas E. Lovejoy,⁷ Joseph O. Sexton,⁸ Mike P. Austin,⁹ Cathy D. Collins,¹⁰ William M. Cook,¹¹ Ellen I. Damschen,¹² Robert M. Ewers,¹³ Bryan L. Foster,¹⁴ Clinton N. Jenkins,¹⁵ Andrew J. King,⁹ William F. Laurance,¹⁶ Douglas J. Levey,¹⁷ Chris R. Margules,^{18,19} Brett A. Melbourne,⁴ A. O. Nicholls,^{9,20} John L. Orrock,¹² Dan-Xia Song,⁸ John R. Townshend⁸

Frammentazione

(A) Il **Debito di Estinzione**: persistente perdita di specie dovuta alla frammentazione

(B) Il **Lag di immigrazione**: differenze in ricchezza di specie dovuta a piccole superfici o isolamento di frammenti.

(C) Il **Debito funzionale**: persistente perdita di funzioni ecosistemiche dovuta a piccole superfici o isolamento di frammenti.

Degrado Forestale

Science

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REPORT

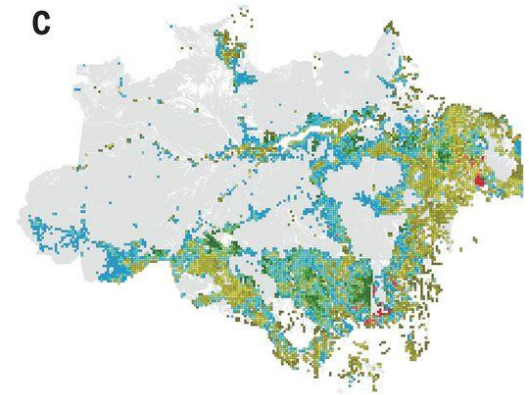
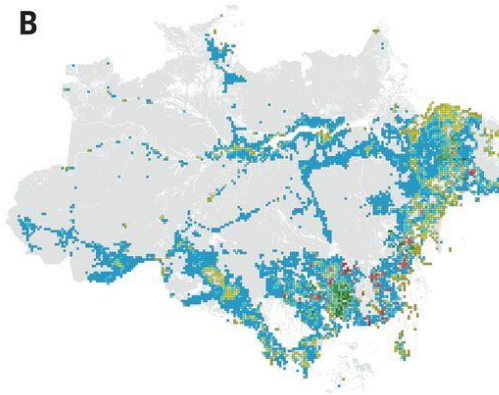
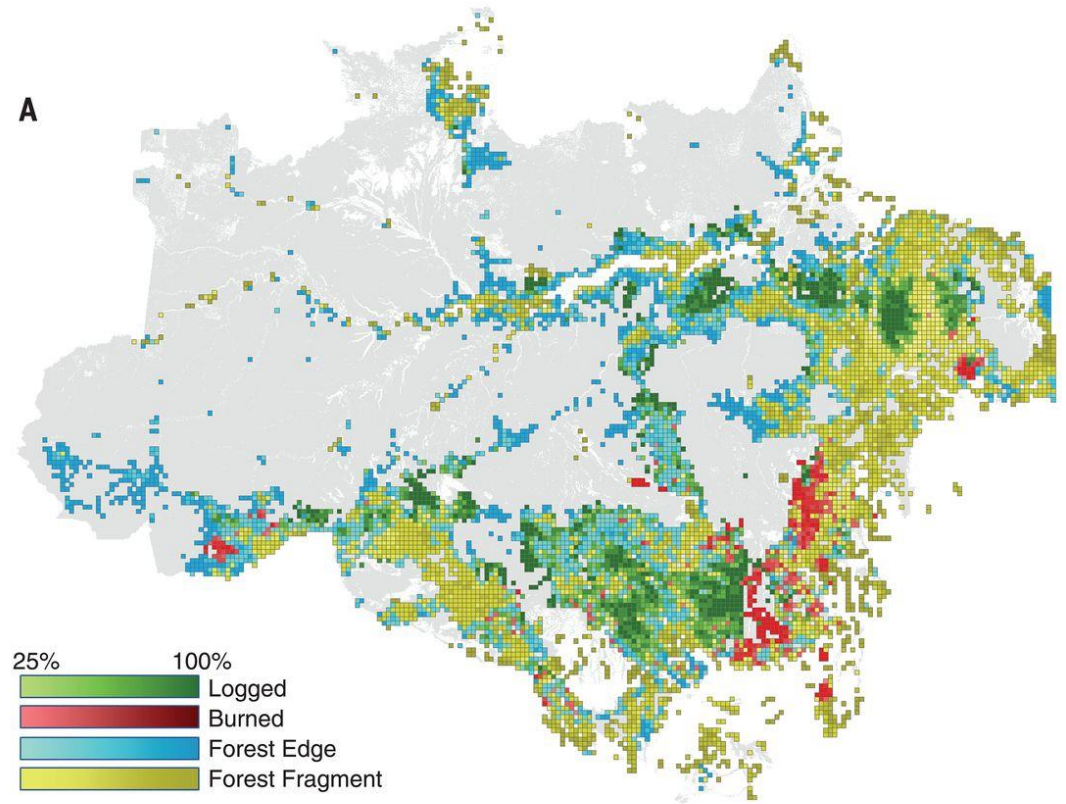


Long-term forest degradation surpasses deforestation in the Brazilian Amazon

ERALDO APARECIDO TRONDOLI MATRICARDI , DAVID LEWIS SKOLE , OLÍVIA BUENO COSTA , MARCOS ANTONIO PEDLOWSKI , JAY HOWARD SAMEK, AND

EDER PEREIRA MIGUEL  [Authors Info & Affiliations](#)

SCIENCE • 11 Sep 2020 • Vol 369, Issue 6509 • pp.1378-1382 • DOI: 10.1126/science.abb3021



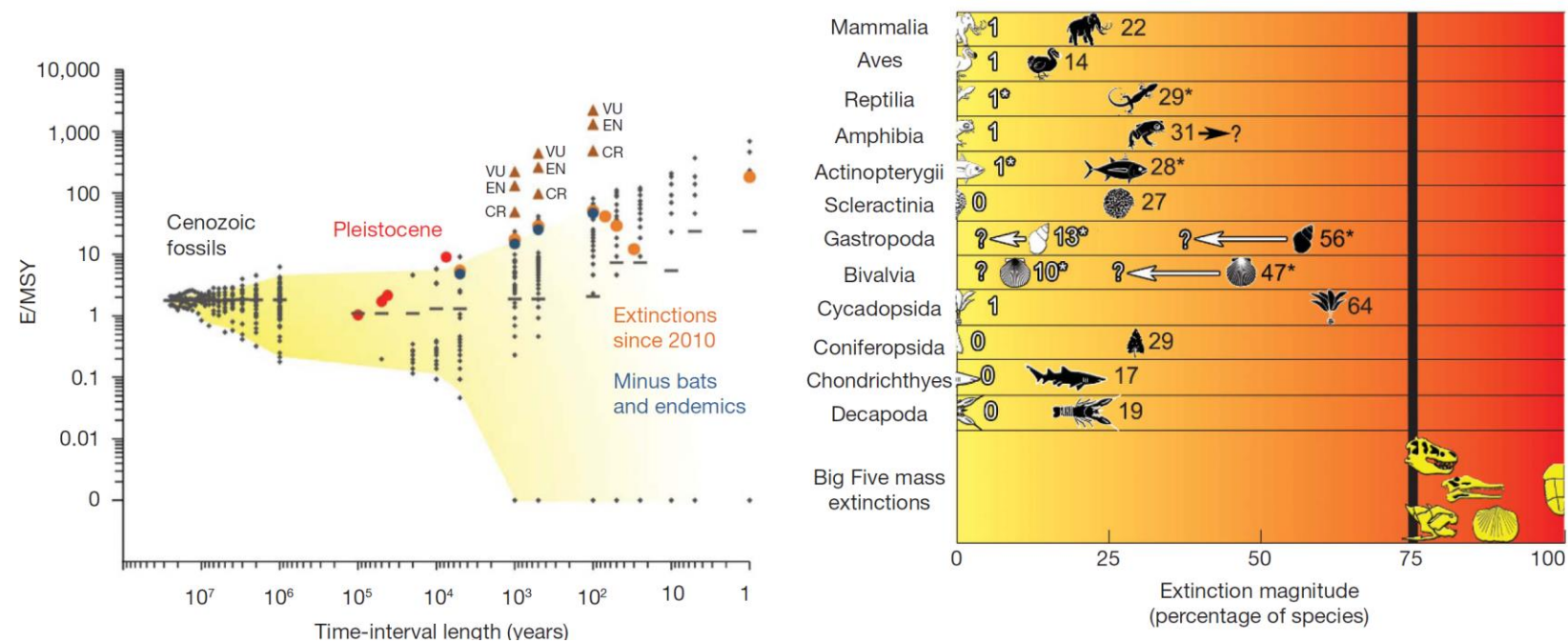
Has the Earth’s sixth mass extinction already arrived?

Anthony D. Barnosky^{1,2,3}, Nicholas Matzke¹, 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}

Palaeontologists characterize mass extinctions as times when the Earth loses more than three-quarters of its species in a geologically short interval, as has happened only five times in the past 540 million years or so. Biologists now suggest that a sixth mass extinction may be under way, given the known species losses over the past few centuries and millennia. Here we review how differences between fossil and modern data and the addition of recently available palaeontological information influence our understanding of the current extinction crisis. Our results confirm that current extinction rates are higher than would be expected from the fossil record, highlighting the need for effective conservation measures.

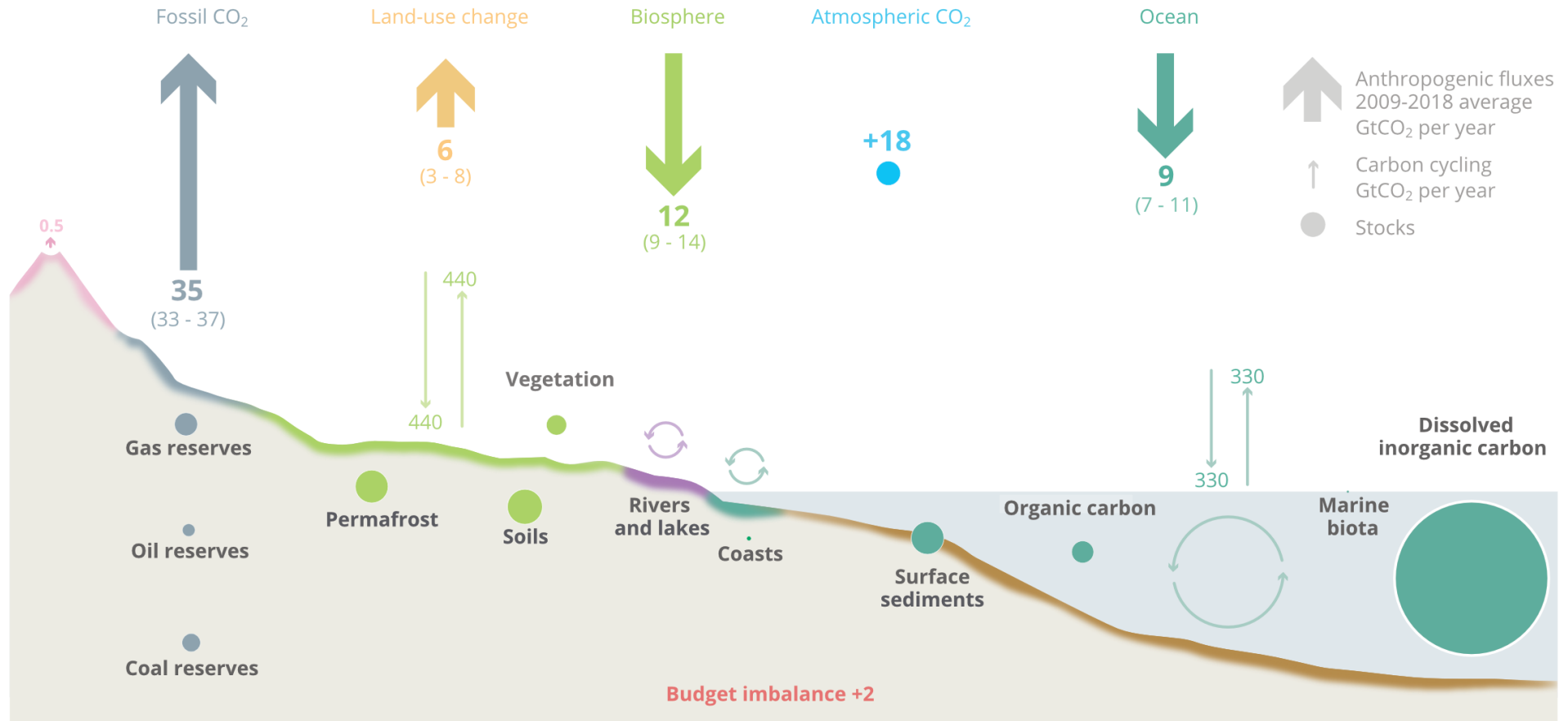
.... the average rate of vertebrate species loss over the last century is up to 100 times higher than the background rate.

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.



Anthropogenic perturbation of the global carbon cycle

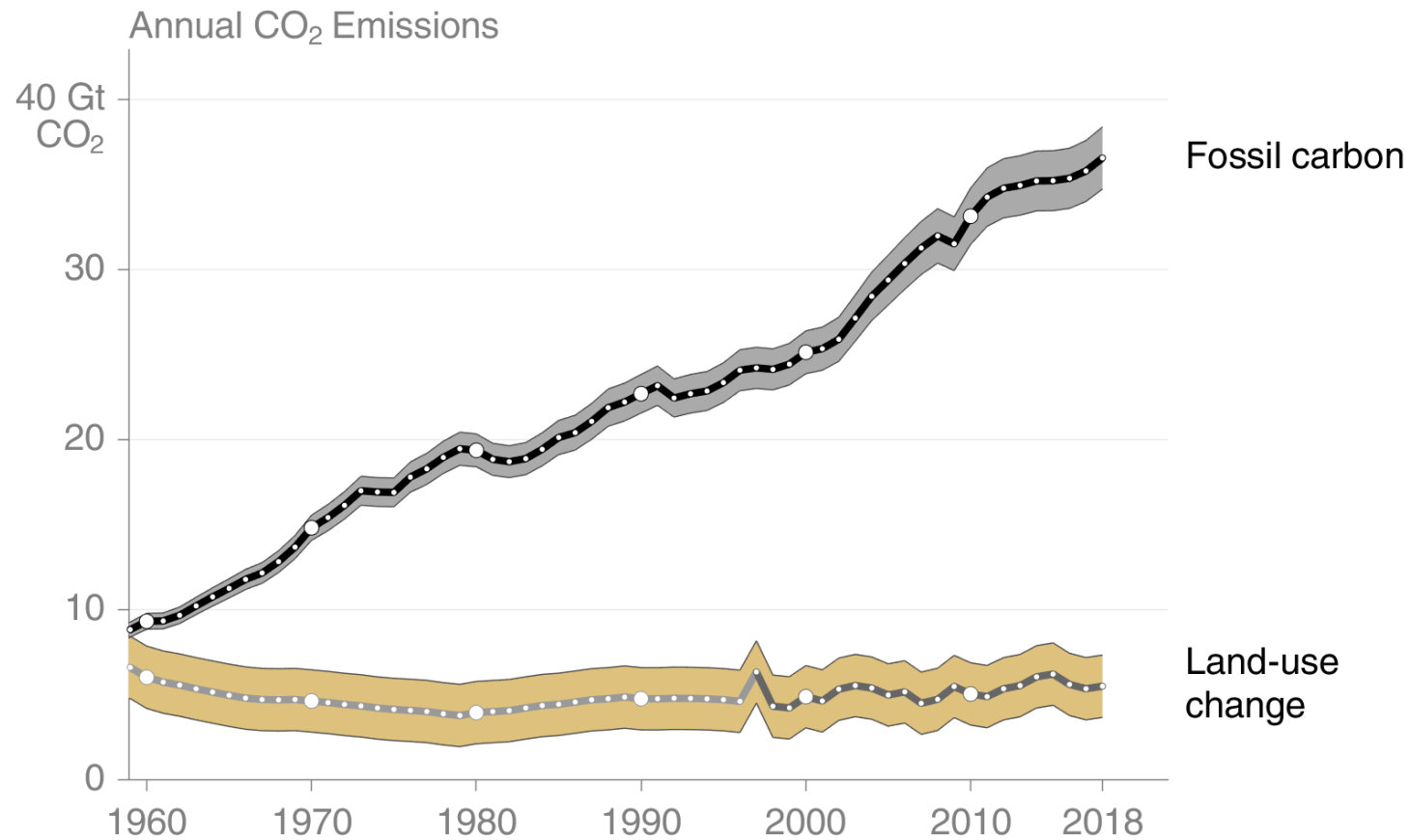
Perturbation of the global carbon cycle caused by anthropogenic activities, averaged globally for the decade 2009–2018 (GtCO₂/yr)



The budget imbalance is the difference between the estimated emissions and sinks.
 Source: [CDIAC](#); [NOAA-ESRL](#); [Friedlingstein et al 2019](#); [Ciais et al. 2013](#); [Global Carbon Budget 2019](#)

Total global emissions

Total global emissions: 42.1 ± 2.8 GtCO₂ in 2018, 55% over 1990
 Percentage land-use change: 39% in 1960, 14% averaged 2009–2018

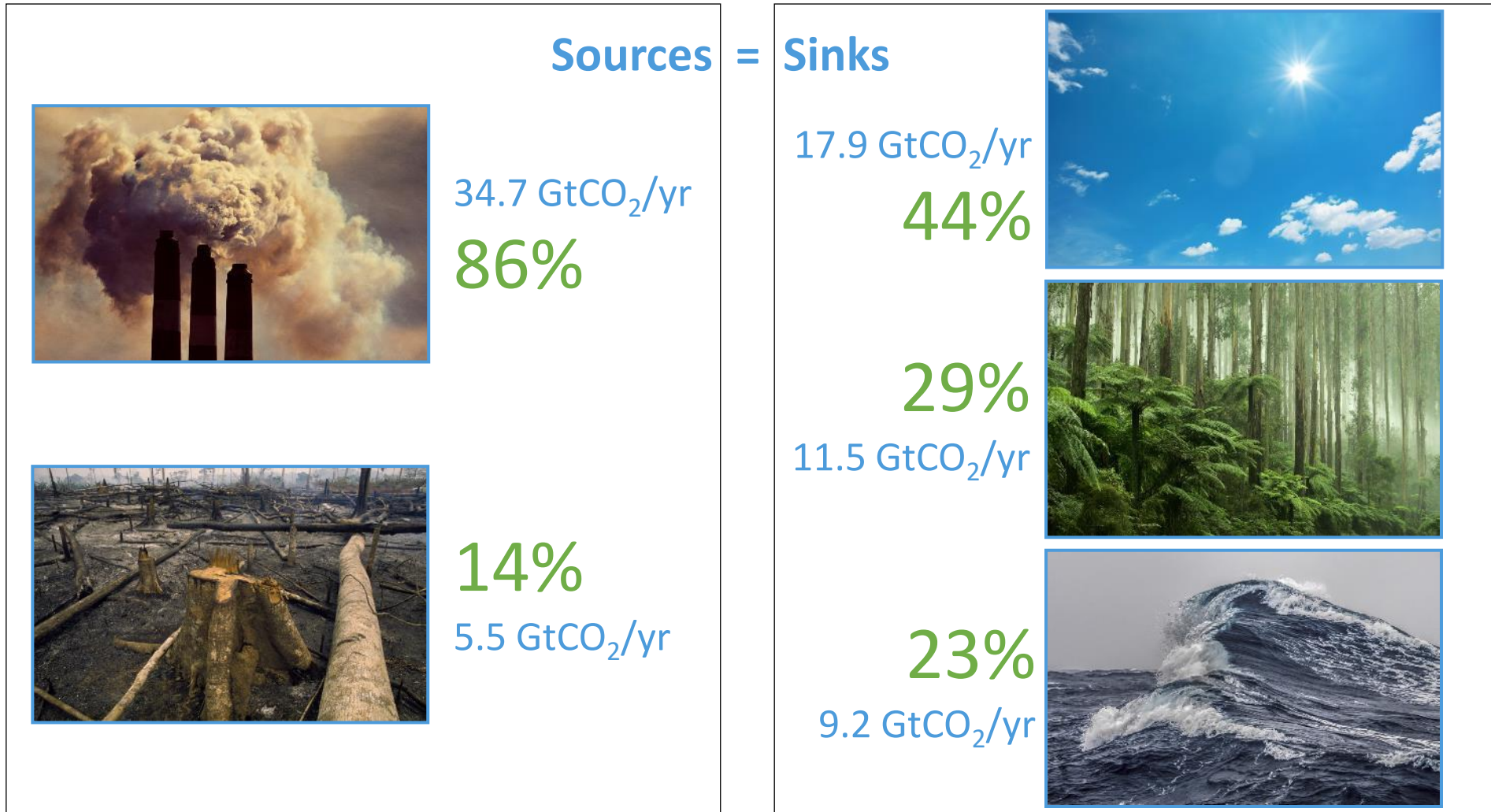


© Global Carbon Project • Data: CDIAC/UNFCCC/BP/USGS/GCP

Land-use change estimates from two bookkeeping models, using fire-based variability from 1997
 Source: [CDIAC](#); [Houghton and Nassikas 2017](#); [Hansis et al 2015](#); [van der Werf et al. 2017](#);
[Friedlingstein et al 2019](#); [Global Carbon Budget 2019](#)



Fate of anthropogenic CO₂ emissions (2009–2018)

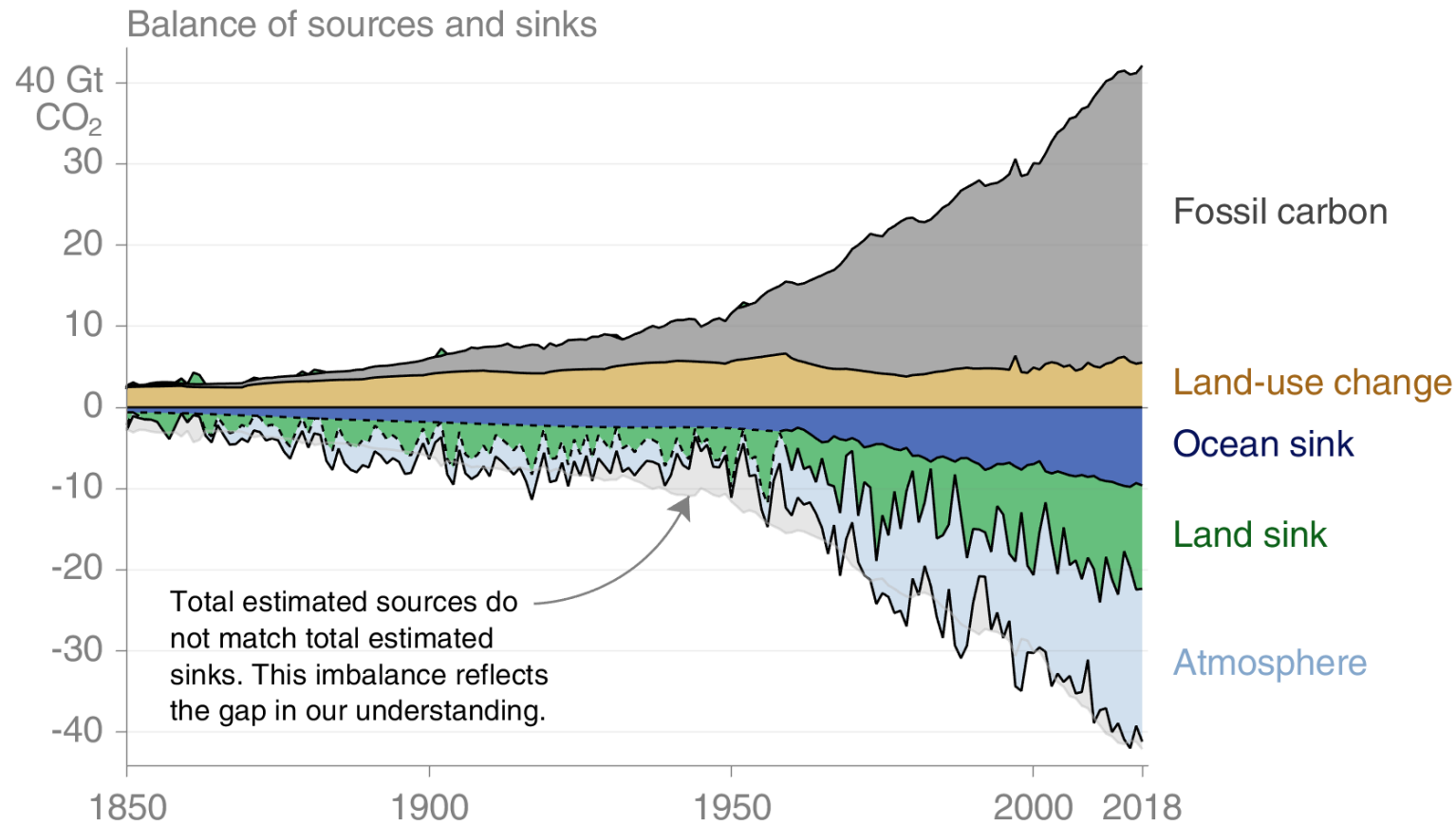


Budget Imbalance:
(the difference between estimated sources & sinks)

4%
1.6 GtCO₂/yr

Global carbon budget

Carbon emissions are partitioned among the atmosphere and carbon sinks on land and in the ocean
The “imbalance” between total emissions and total sinks reflects the gap in our understanding

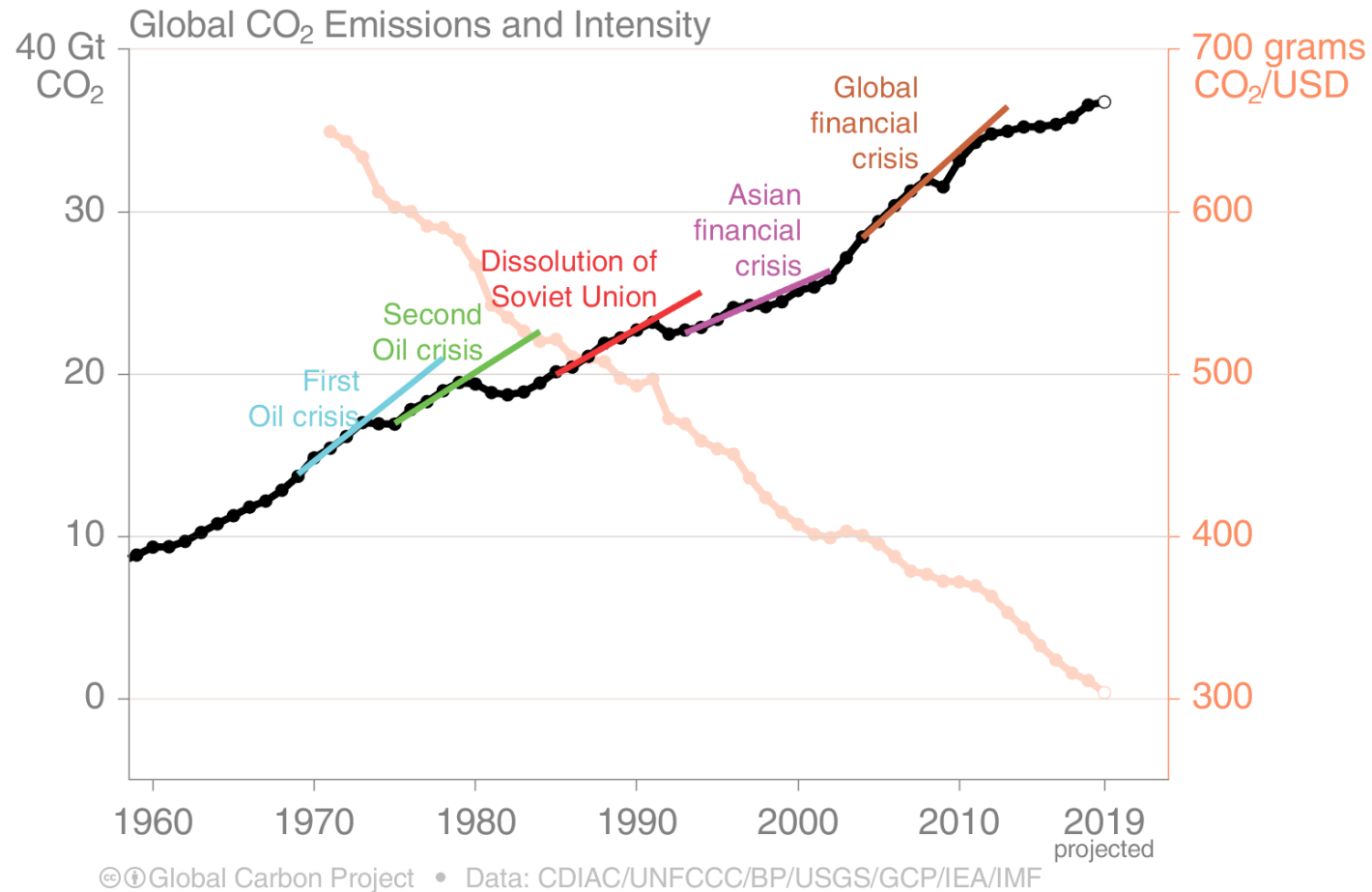


© Global Carbon Project • Data: CDIAC/GCP/NOAA-ESRL/UNFCCC/BP/USGS

Source: [CDIAC](#); [NOAA-ESRL](#); [Houghton and Nassikas 2017](#); [Hansis et al 2015](#); [Joos et al 2013](#); [Khatiwala et al. 2013](#); [DeVries 2014](#); [Friedlingstein et al 2019](#); [Global Carbon Budget 2019](#)

Fossil CO₂ emission intensity

Global CO₂ emissions growth has generally resumed quickly from financial crises. Emission intensity has steadily declined but not sufficiently to offset economic growth.

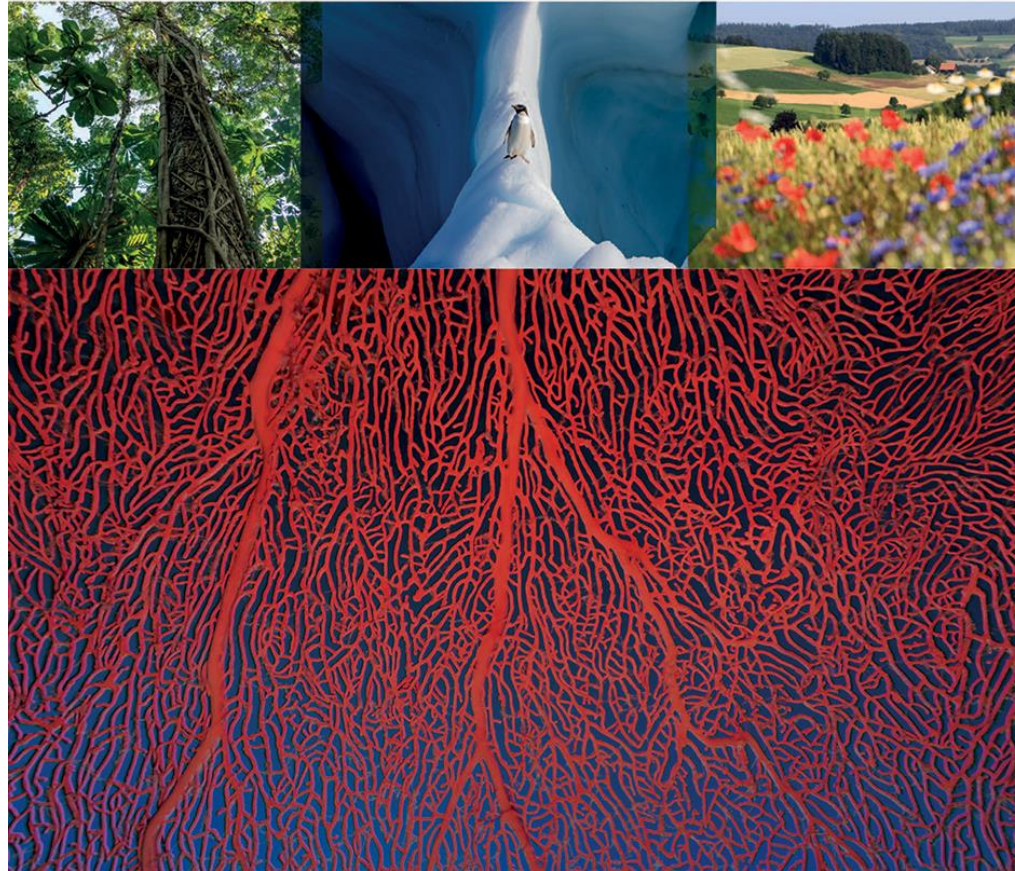


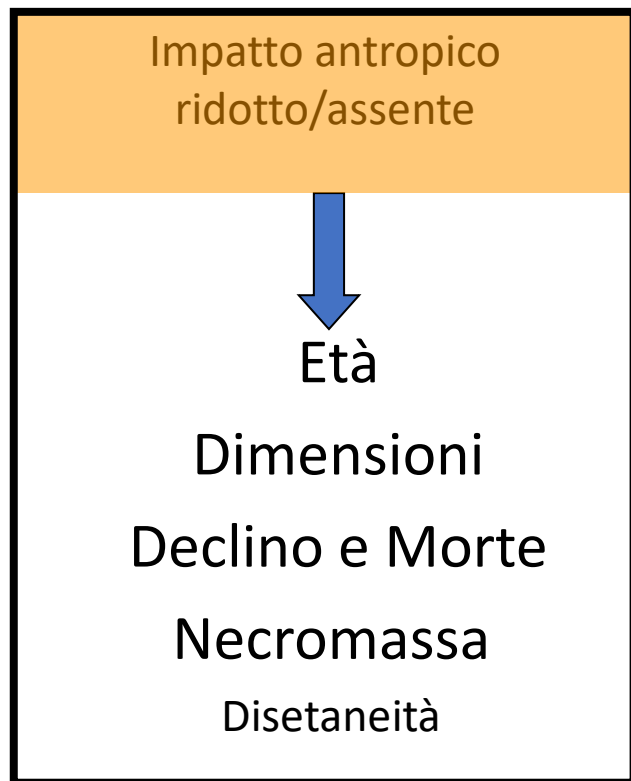
Economic activity is measured in purchasing power parity (PPP) terms in 2010 US dollars.
 Source: [CDIAC](#); [Peters et al 2012](#); [Friedlingstein et al 2019](#); [Global Carbon Budget 2019](#)

IPBES-IPCC CO-SPONSORED WORKSHOP

BIODIVERSITY AND CLIMATE CHANGE

Scientific outcome



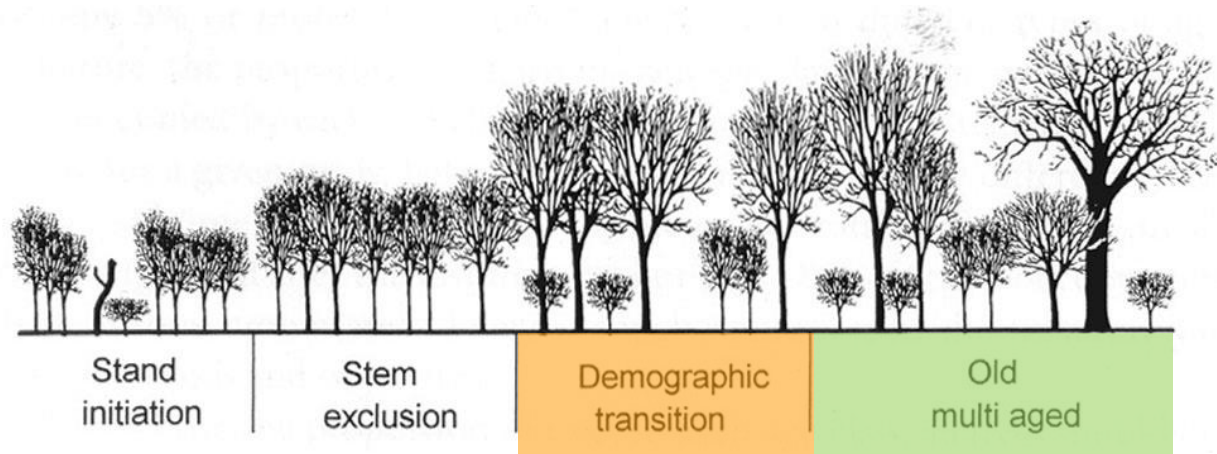


Lo stato di foresta vetusta

Ecosistemi caratterizzati da alberi annosi e dai relativi attributi strutturali

(USFS, 1989)

[...] una FV si trova negli ultimi stadi di sviluppo strutturale (Spies, *Journal of Forestry*, 2004)



Attributi FV

→ Dinamiche FV

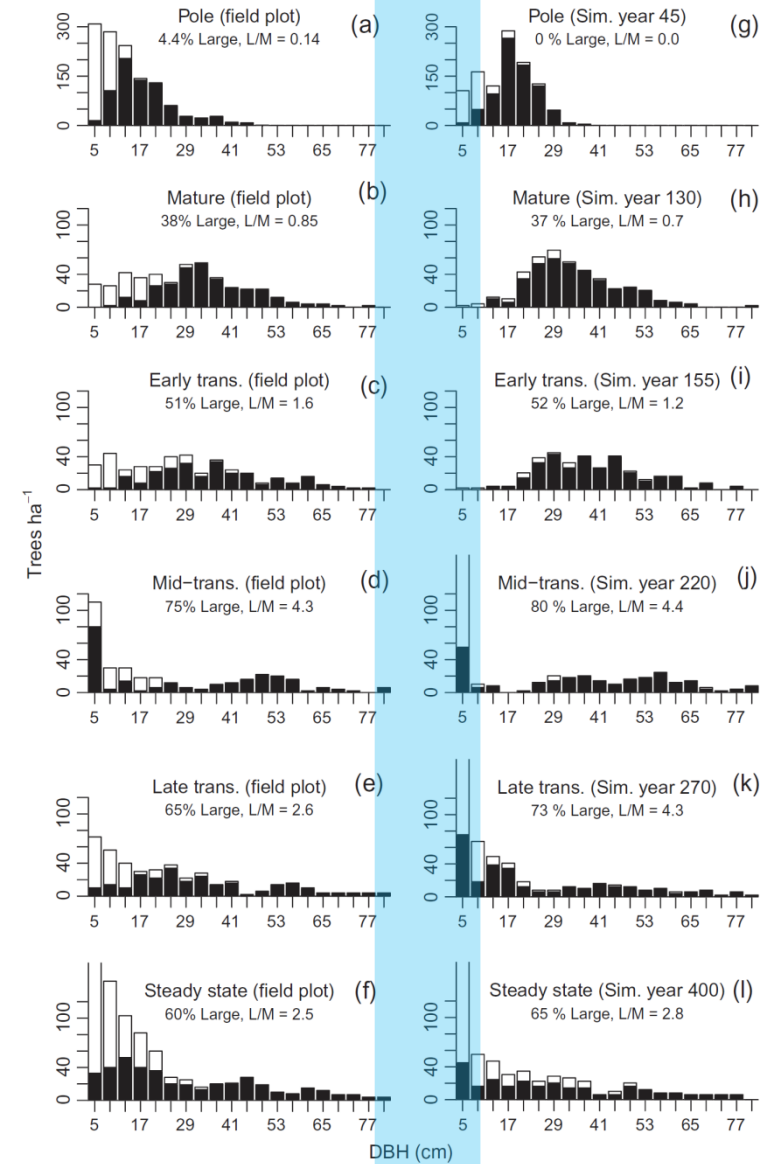
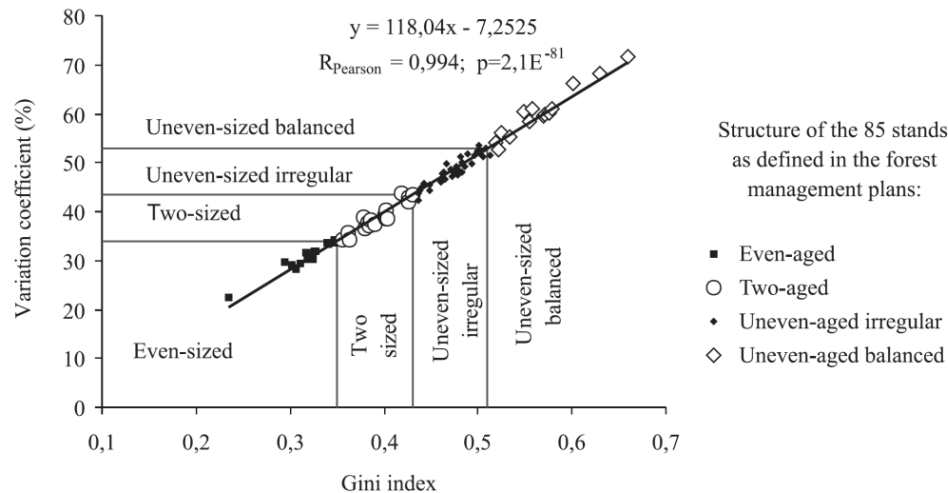
→ Grado di Naturalità

Foreste vetuste tardo-successionali

Età del popolamento non descrive quanto tempo è trascorso dall'ultimo disturbo di elevata severità

→ *difficoltà di stabilire cronosequenze*

→ *dinamiche strutturali preferite per descrivere l'avanzamento di OG*



Indici di complessità strutturale (Gini, CV)

Il Monitoraggio scientifico nelle FV

Attributi Strutturali: *Campionamento per AdS*

→ **Indicatori Strutturali**

Processi Endogeni/Esogeni: *AdS permanenti, dendroecologia*

→ **Indicatori di Processo**

Table II. Variables considered in this study (in bold: variables selected through PCA).

Code	Description	Unit
LTSIs		
N	Stand density ($\text{DBH} \geq 2.5 \text{ cm}$)	Stems ha^{-1}
N10	Density of small trees ($\text{DBH} < 12.5 \text{ cm}$)	Stems ha^{-1}
N70	Density of large trees ($\text{DBH} \geq 67.5 \text{ cm}$)	Stems ha^{-1}
St	Stature (mean height of the five tallest trees in the stand)	m
BA	Basal area	$\text{m}^2 \text{ ha}^{-1}$
V	Total woody volume of living trees	$\text{m}^3 \text{ ha}^{-1}$
V70/V	Relative volume of large trees ($\text{DBH} \geq 67.5 \text{ cm}$)	%
DTSIs		
DW	Total deadwood volume (snags + CWD)	$\text{m}^3 \text{ ha}^{-1}$
SNV	Snag volume	$\text{m}^3 \text{ ha}^{-1}$
CWDV	CWD volume (logs + large branches)	$\text{m}^3 \text{ ha}^{-1}$
DW/LV	Total deadwood volume/total woody volume of living trees	%
SN50	Density of medium-size snags ($\text{DBH} \geq 47.5 \text{ cm}$)	Stems ha^{-1}
SN70	Density of large snags ($\text{DBH} \geq 67.5 \text{ cm}$)	Stems ha^{-1}
Chronological indicators		
AgeMax	Age of the oldest tree cored in the stand	Years
Age5	Mean age of the five oldest trees cored in the stand	Years

Indicatori
Strutturali

Biomassa

Necromassa

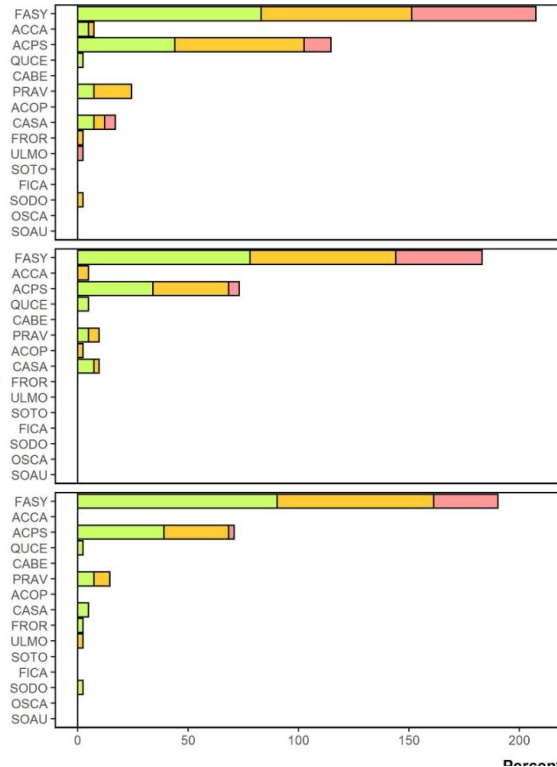
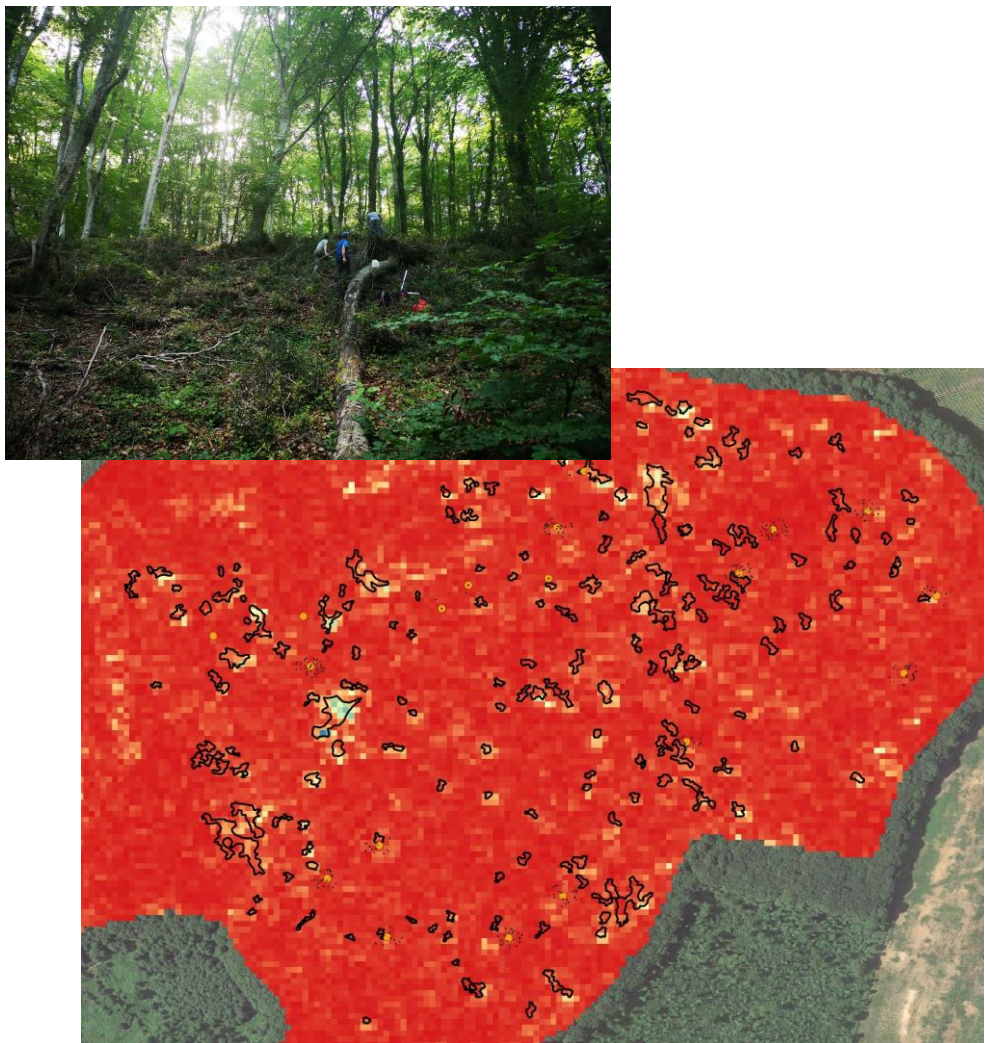
Indicatori
Cronologici

LTSI, live trees structural indicators; DBH, diameter at breast height (1.3 m from the ground); DTSTI, dead tree structural indicators.

Disentangling the role of past human interferences and biogeoclimate

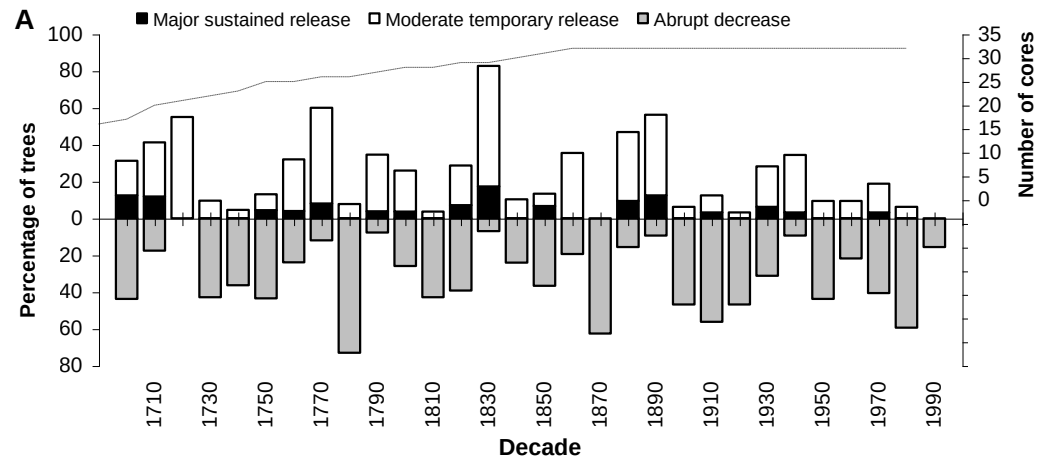
E. ZIACO¹, A. DI FILIPPO¹, A. ALESSANDRINI¹, M. BALIVA^{1,2}, E. D'ANDREA^{3,4}, & G. PIOVESAN¹

Regime di Disturbo e Analisi dell'affermazione della rinnovazione naturale



Ricostruzione del Regime di Disturbo

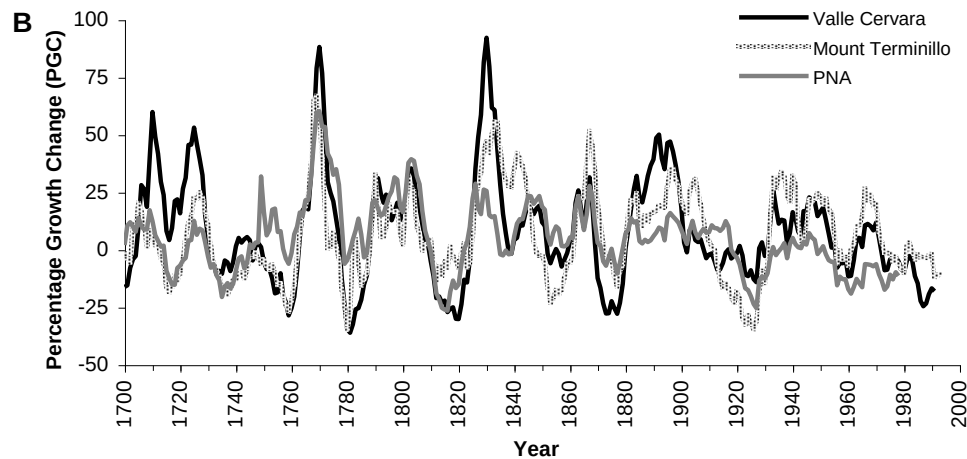
Rilasci e soppressioni nella crescita xilematica



Journal of Vegetation Science 16: 13-28, 2005
© IAVS; Opulus Press Uppsala.

**Structure, dynamics and dendroecology
of an old-growth *Fagus* forest in the Apennines**

Piovesan, G.^{1,*}; Di Filippo, A.¹; Alessandrini, A.¹; Biondi, F.² & Schirone, B.¹

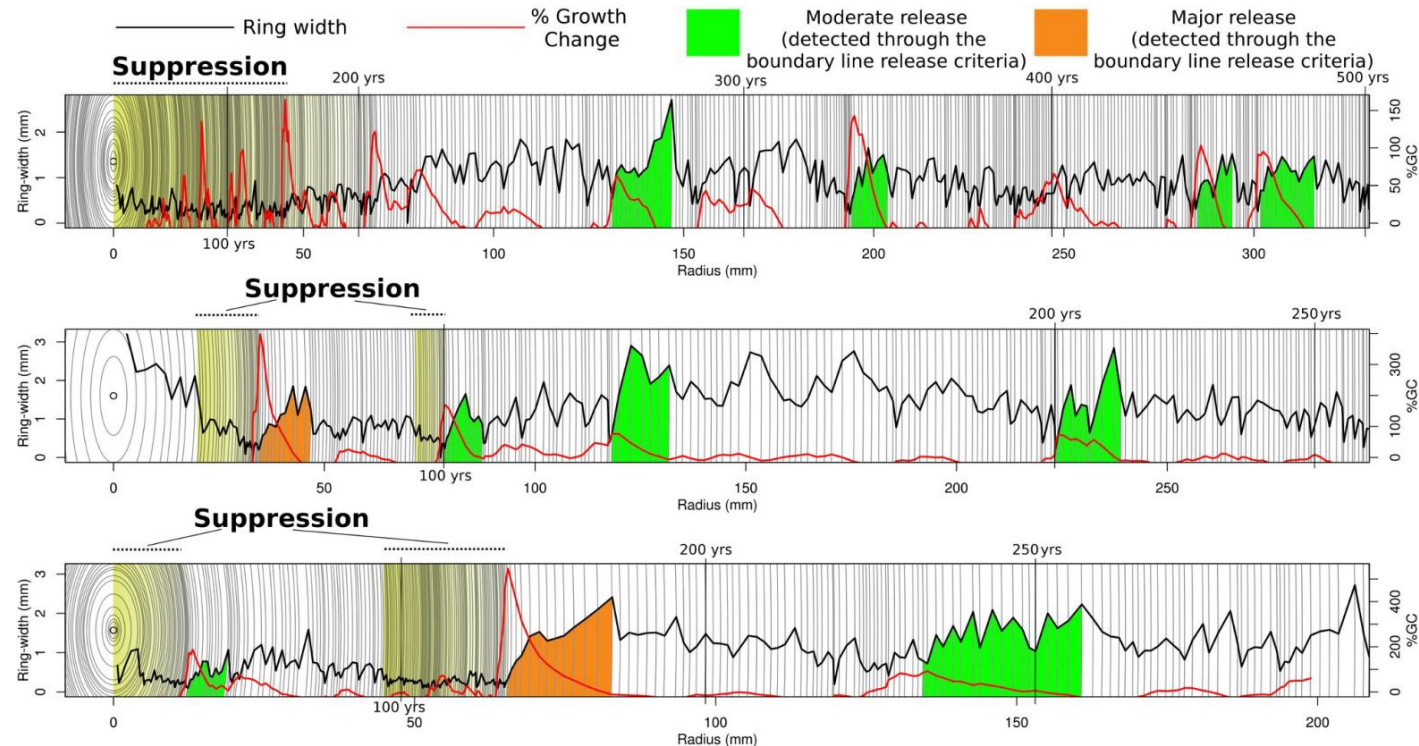


**Azione sincronizzante del
clima (siccità, gelate,
gelicidio/galaverna) su larga
scala**

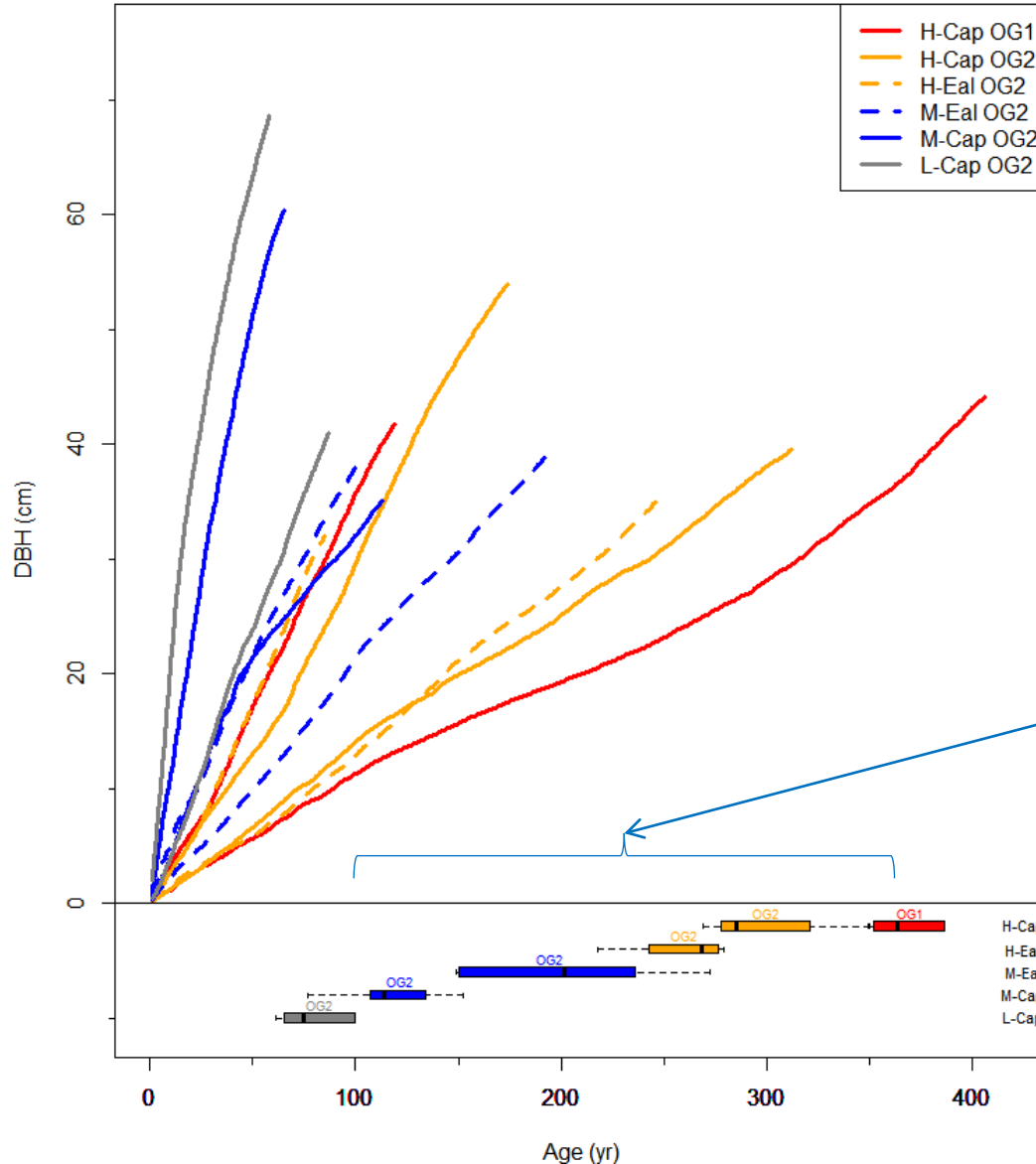
Variazioni percentuali a scala decennale

Sviluppo di indicatori dendroecologici di processo per quantificare i processi ecologici distintivi delle foreste vetuste

- Fasi di **Soppressione**: diverse, più lunghe
- **Disturbi** multipli, distribuiti stocasticamente
- **Dinamiche di reclutamento** complesse
- **Struttura per età** complessa



Growth trajectories VS. Bioclimate



Metric	Unit	High-mountain		Mountain	Low-elevation
		OG1	OG2	OG2	OG2
SCI Gini Coefficient	-	74-80	56-65	39-58	37-42
AI MEAN	years	312-385	216-308	136-284	83-110
	years	322-371	105-257	74-199	49-57
	years	514-528	342-435	185-320	114-132
	years	548-559	348-520	220-351	115-136
GHI ForkRANGE3	years	266-268	110-185	70-95	46-74
	years	360-397	242-309	100-243	66-106
DSI Rel1Yr.D	-	82-90	83-90	53-79	68-73
	n	4.0-5.2	3.0-4.4	1.2-3.0	1.4-1.6
	years	70-117	49-77	14-36	10-21

SCI: Structural Complexity Indices. AI, GHI, DSI: Age, Growth History, Disturbance-Suppression Indicators.

Canopy accession age varies largely according to mean growth rates

Journal of Applied Ecology

Journal of Applied Ecology 2016

doi: 10.1111/1365-2664.12793

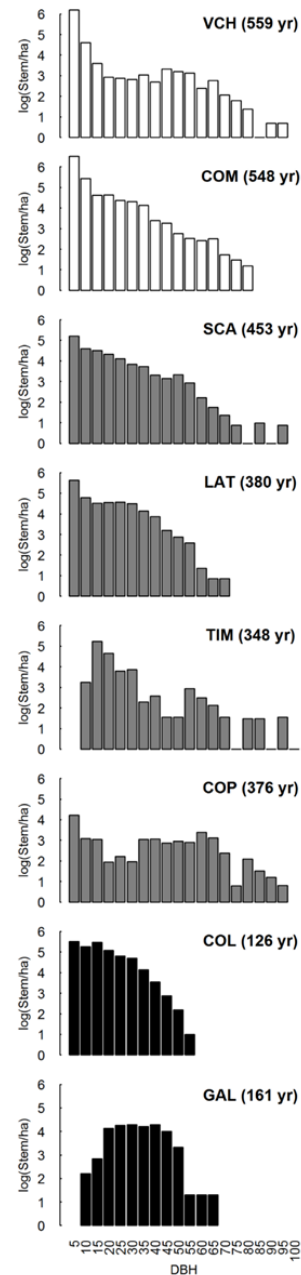
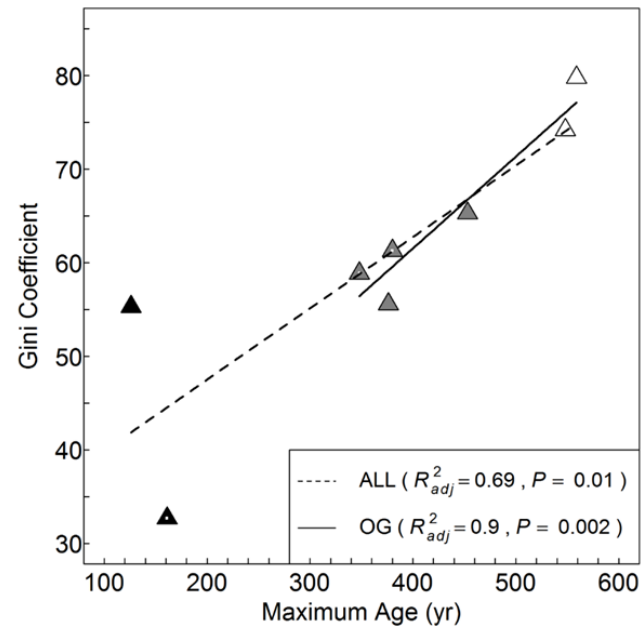
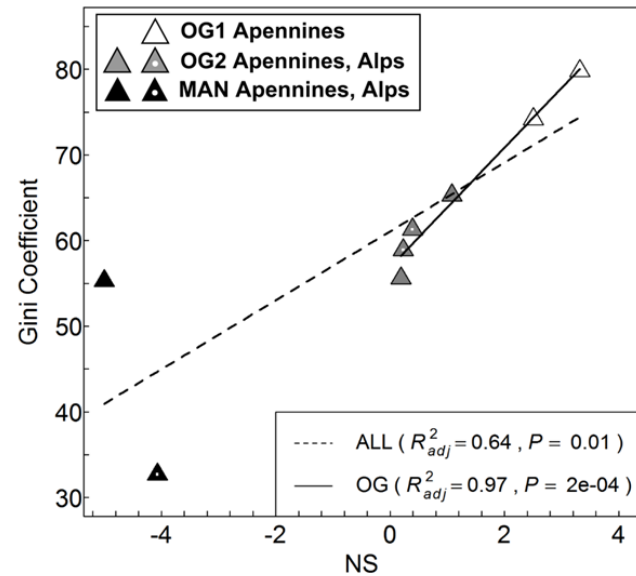
Tree ring-based metrics for assessing old-growth forest naturalness

Alfredo Di Filippo^{1*}, Franco Biondi², Gianluca Piovesan¹ and Emanuele Ziaco^{1,2}

Tree ring-based metrics for assessing old-growth forest naturalness

Alfredo Di Filippo^{1*}, Franco Biondi², Gianluca Piovesan¹ and Emanuele Ziaco^{1,2}**INDICATORI DI PROCESSO IN
FAGGETE VETUSTE**

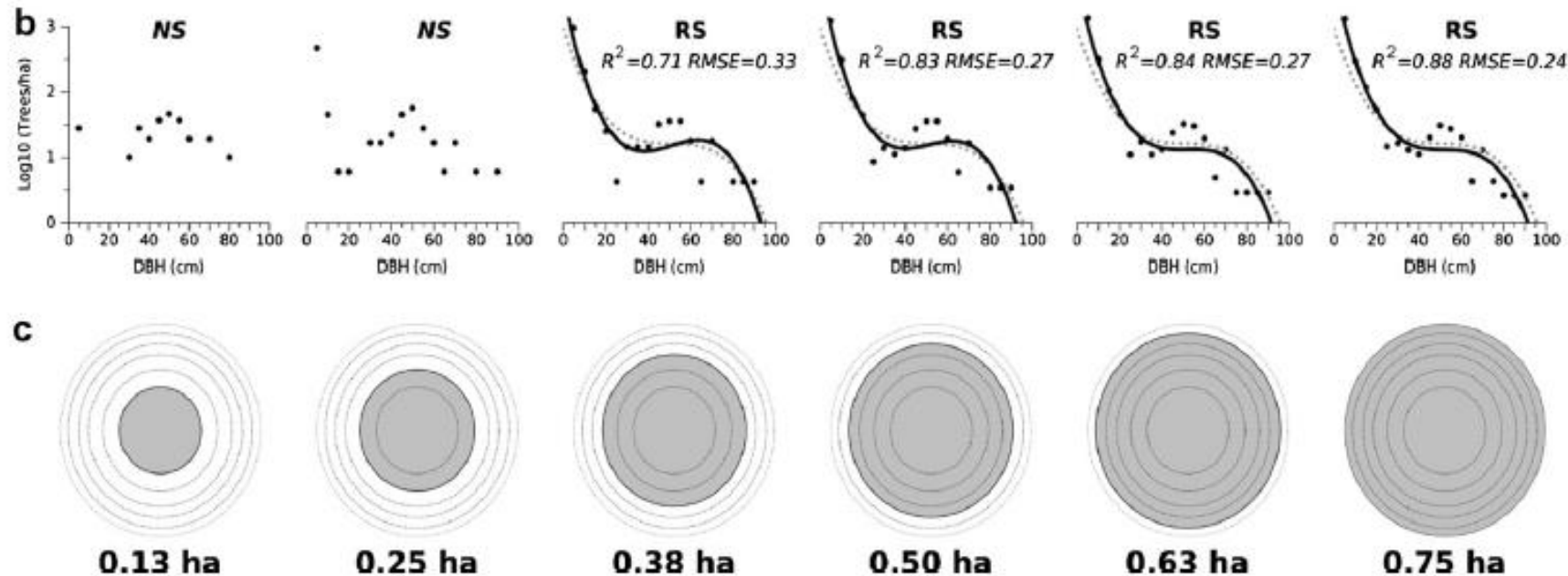
- **N fasi di soppressione:** fino a 5
- **L soppressione:** fino a 75 anni in una singola fase, 150 anni in totale
- **Reclutamento asincrono**
- **Complessità traiettorie crescita**
- **Età Max e Range**



Rotated-sigmoid structure realized at small spatial scale

Tree size distribution at increasing spatial scales converges to the rotated sigmoid curve in two old-growth beech stands of the Italian Apennines

Alfredo Alessandrini^a, Franco Biondi^b, Alfredo Di Filippo^a, Emanuele Ziaco^a, Gianluca Piovesan^{a,*}



Assessing the minimum area required to protect OG remnants



Alla scoperta di una foresta vetusta.

la Faggeta di Soriano nel Cimino

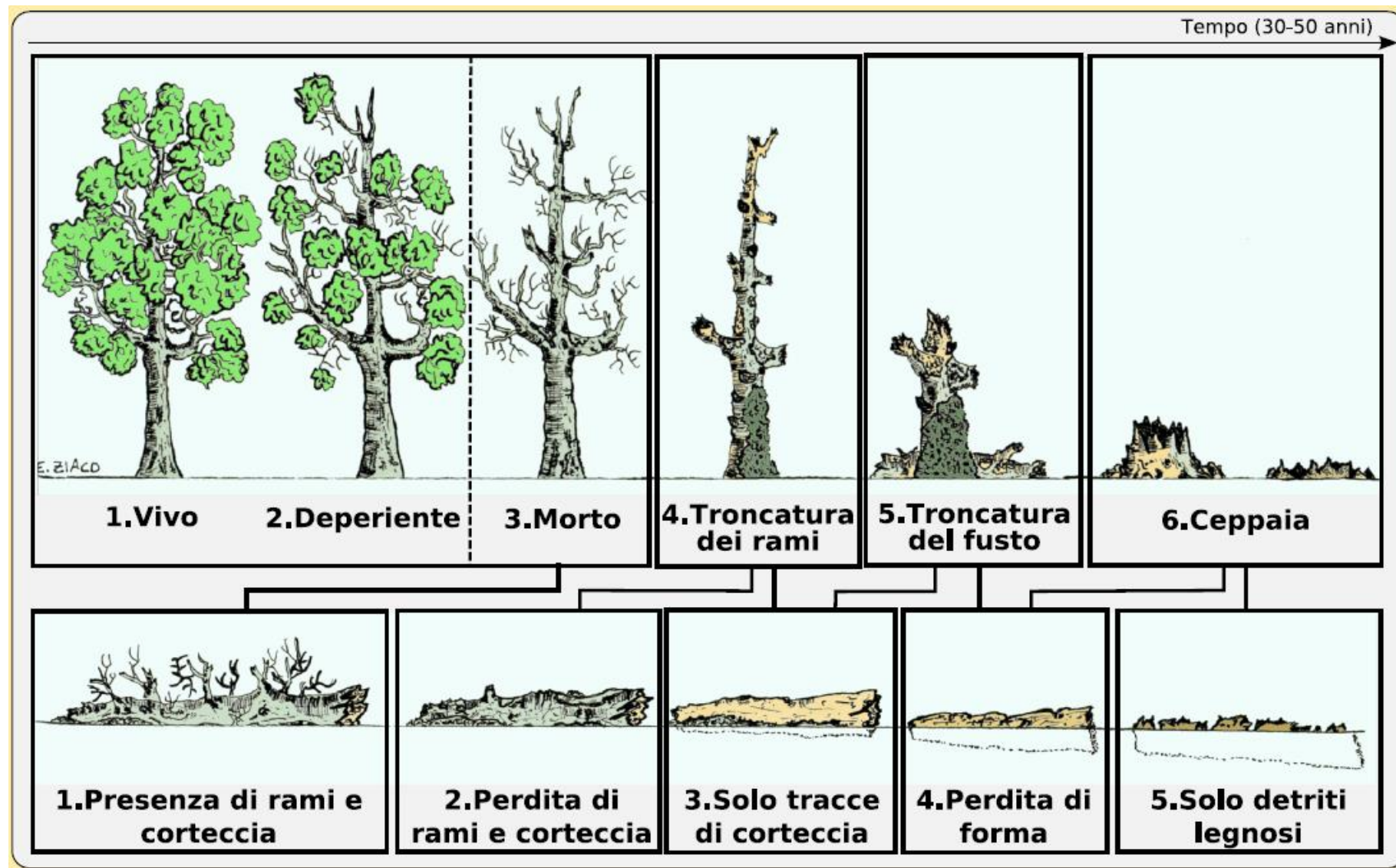
– Il Sentiero Natura –



Comune di
Soriano nel Cimino

D.A.F. - Di.S.A.F.R.I.

DOCUF





Alla scoperta di una foresta vetusta:

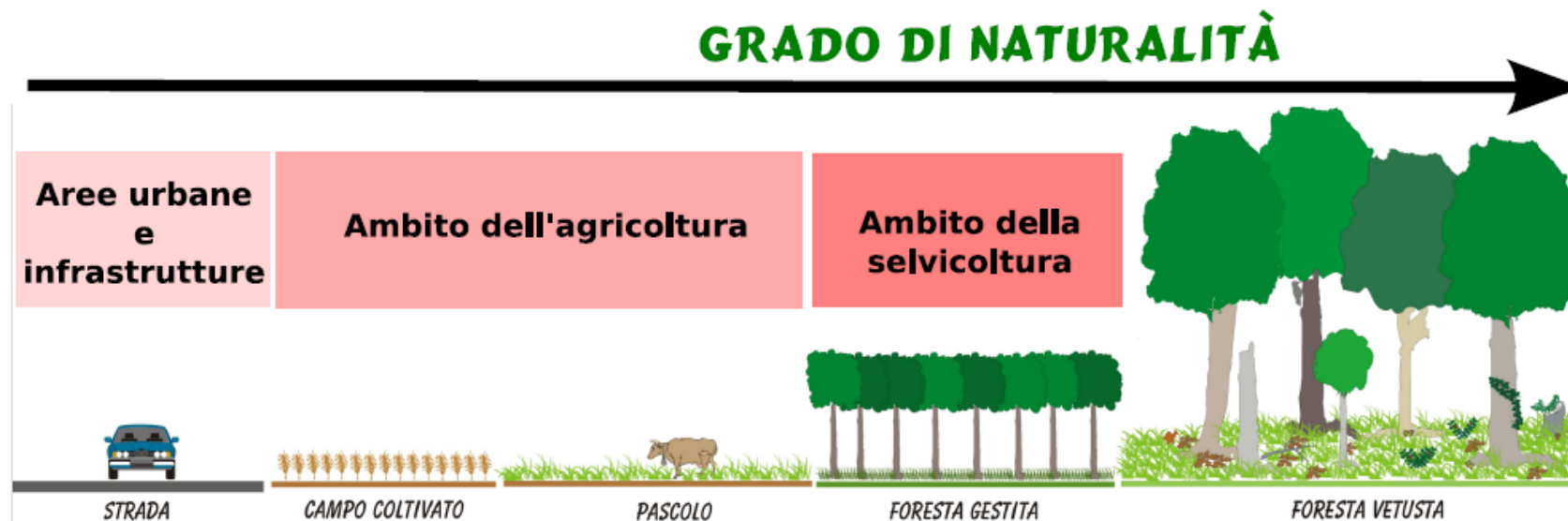
la Faggeta di Soriano nel Cimino

– Il Sentiero Natura –



UNIVERSITÀ
Tuscia
D.A.F. - Di.S.A.F.R.I.

DOCUF



Il grado di naturalità di diversi ambienti dipende dall'impatto dell'uomo sulla struttura e il funzionamento degli ecosistemi.



Alla scoperta di una foresta vetusta:

la Faggeta di Soriano nel Cimino – Il Sentiero Natura –



UNIVERSITÀ
Tuscia
D.A.F. - Di.S.A.F.Ri.



L'albero habitat



*Descrizione della struttura,
crescita e anatomia dei
faggi vetusti delle faggete
UNESCO*



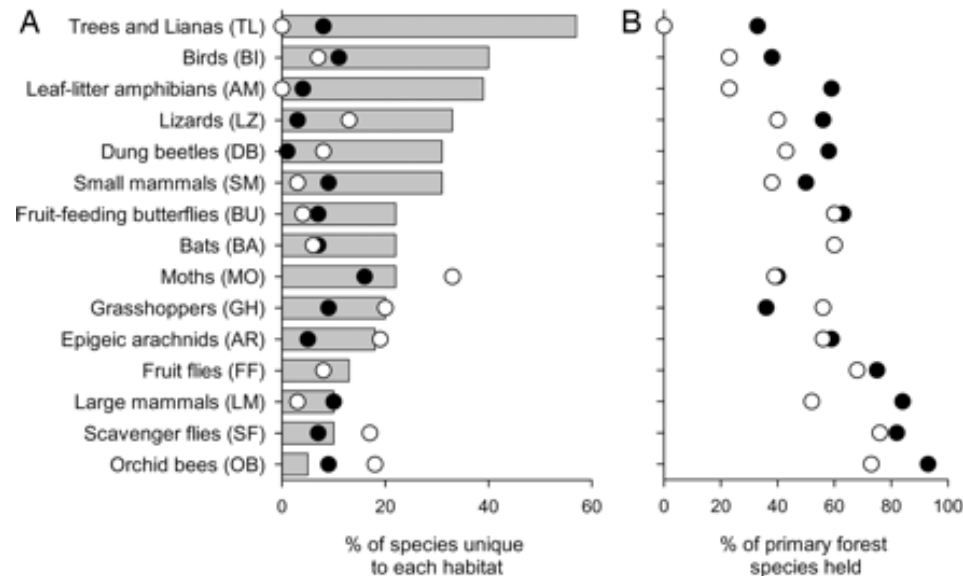
Unicità delle Foreste Primarie



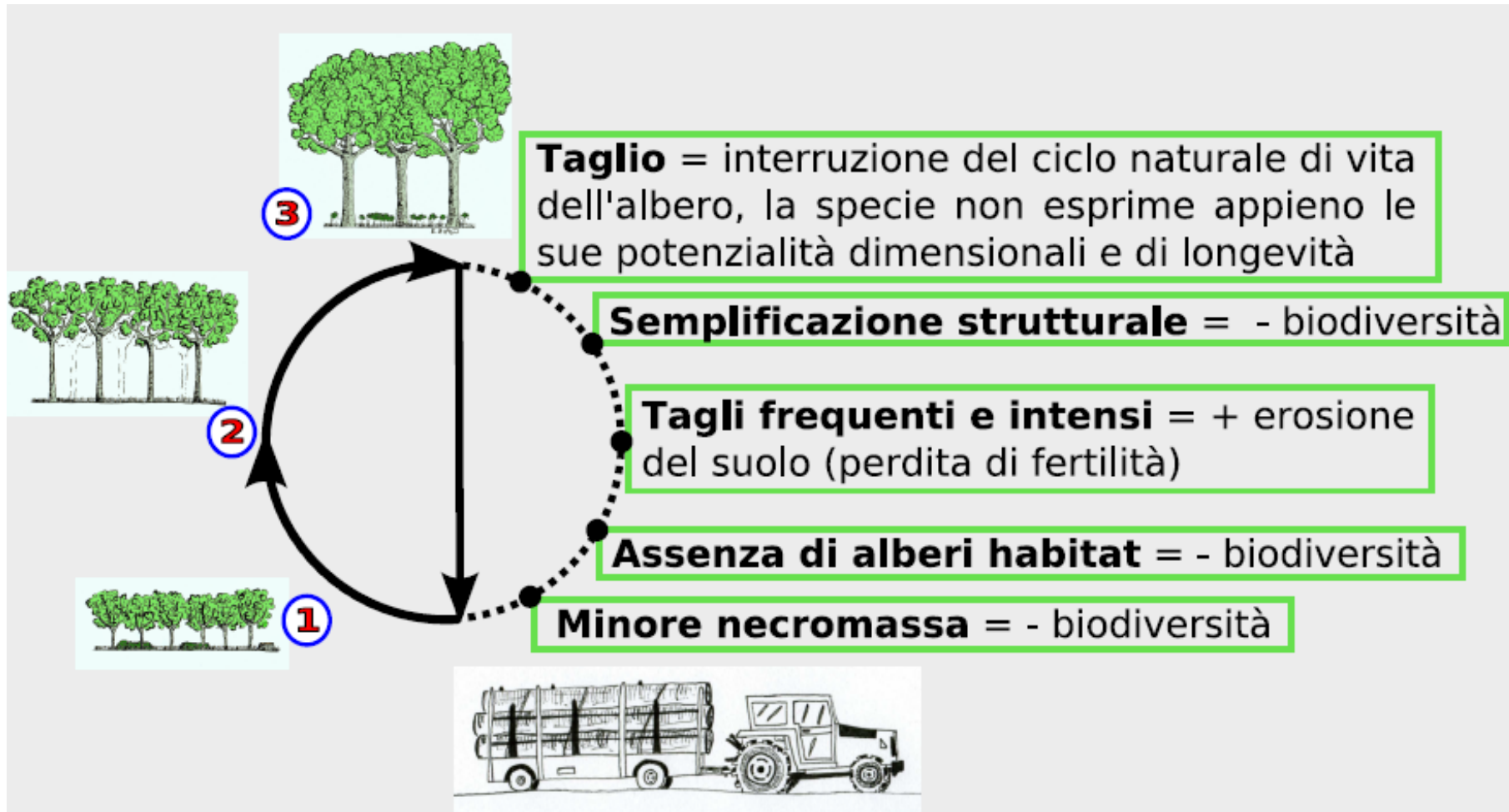
Quantifying the biodiversity value of tropical primary, secondary, and plantation forests

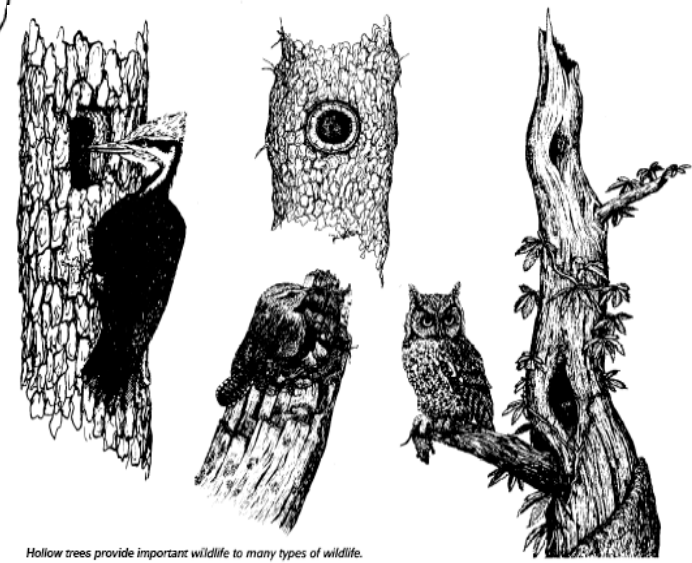
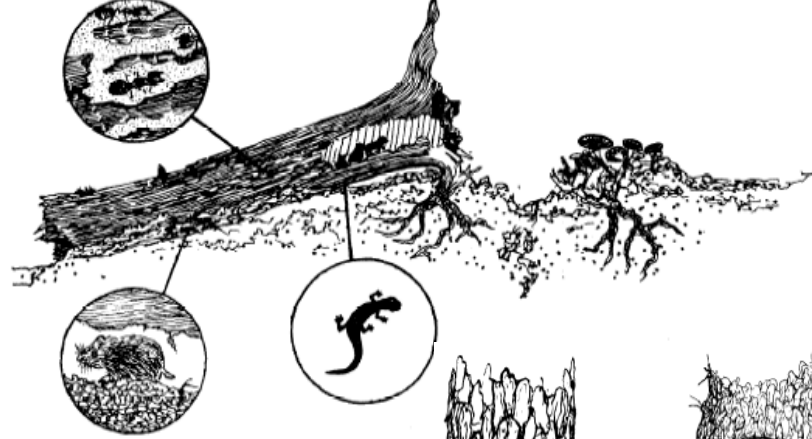
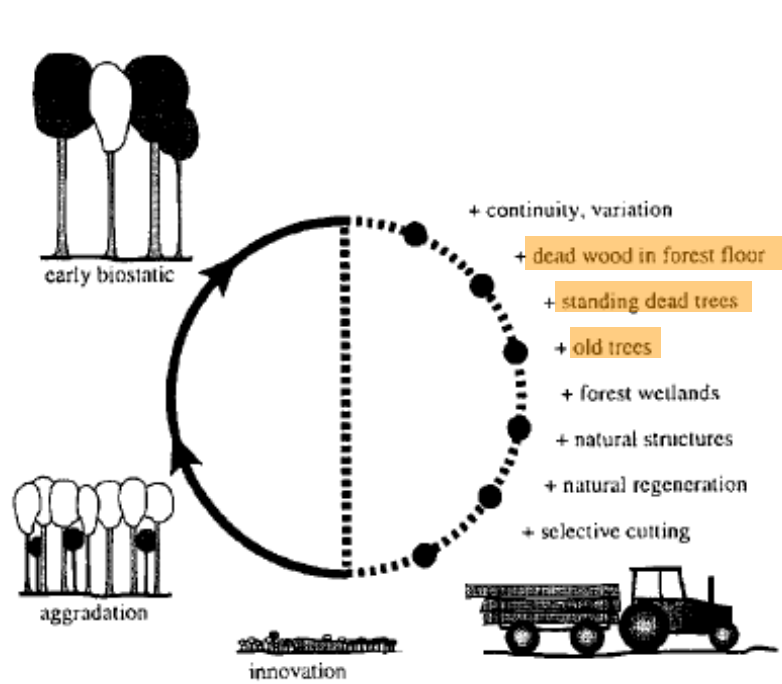
J. Barlow^{*††}, T. A. Gardner^{*}, I. S. Araujo[†], T. C. Ávila-Pires[†], A. B. Bonaldo[†], J. E. Costa[†], M. C. Esposito[†], L. V. Ferreira[†], J. Hawes^{*}, M. I. M. Hernandez[§], M. S. Hoogmoed[†], R. N. Leite[¶], N. F. Lo-Man-Hung[†], J. R. Malcolm[¶], M. B. Martins[†], L. A. M. Mestre^{**}, R. Miranda-Santos[†], A. L. Nunes-Gutjahr[†], W. L. Overal[†], L. Parry^{*}, S. L. Peters^{††}, M. A. Ribeiro-Junior[†], M. N. F. da Silva[§], C. da Silva Motta[§], and C. A. Peres^{*}

^{*}Centre for Ecology, Evolution and Conservation, School of Environmental Sciences, University of East Anglia, Norwich NR4 7TJ, United Kingdom; [†]Museu Paraense Emílio Goeldi (MPEG), Avenida Perimetral 1901, Bairro Terra Firme, 66077-530 Belém, Pará, Brazil; [§]Universidade Federal da Paraíba, Cidade Universitária-Campus I, CEP 58059-900 João Pessoa, Paraíba, Brazil; [¶]Instituto Nacional de Pesquisas da Amazonia, Avenida André Araújo 2936, Petrópolis, CEP 69083-000 Manaus, Amazonas, Brazil; [¶]Faculty of Forestry, University of Toronto, Toronto, ON, Canada M5S 3B3; ^{**}Laboratório de Ornitologia, CEM Universidade Federal do Paraná, Avenida Beira-mar, s/n., CEP 83.255-000 Pontal do Sul, Paraná, Brazil; and ^{††}University of Western Ontario, London, ON, Canada N6A 4B8

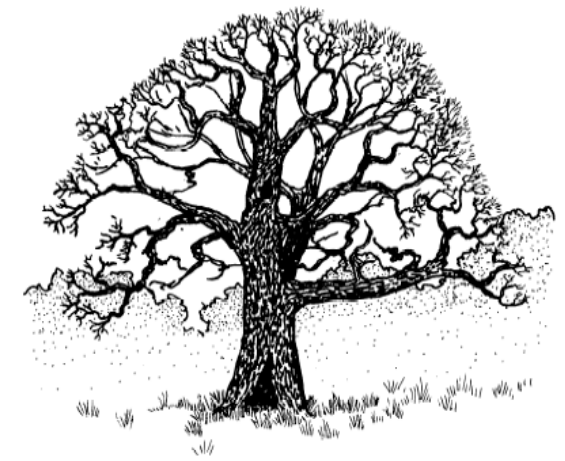


Il Regime di Disturbo Naturale vs Artificiale

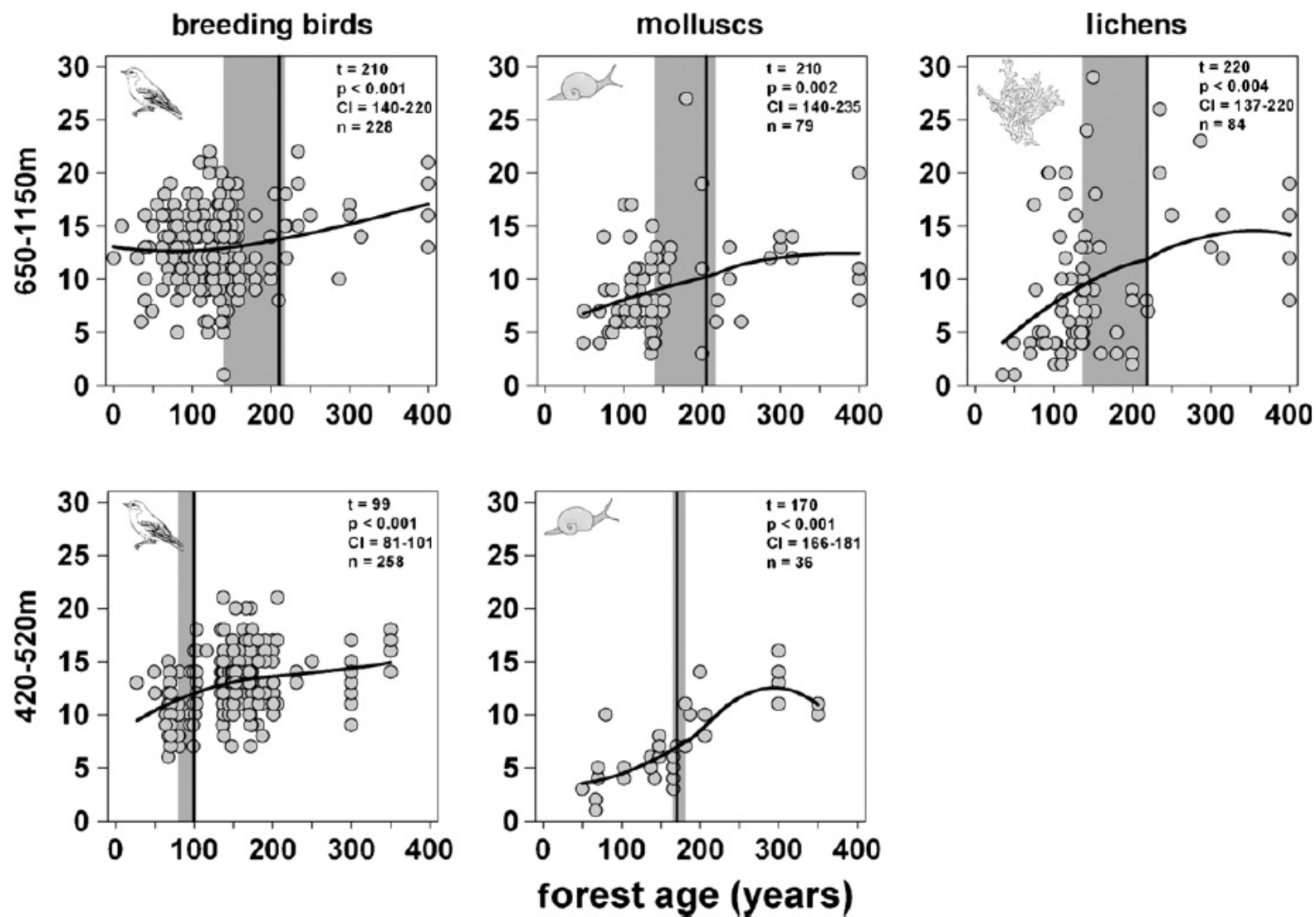




Hollow trees provide important wildlife to many types of wildlife.



species density



ECOLOGICAL INDICATORS 9 (2009) 922-932

Critical forest age thresholds for the diversity of lichens, molluscs and birds in beech (*Fagus sylvatica* L.) dominated forests

Christoph Moning*, Jörg Müller

Nationalpark Bayerischer Wald, Freyunger Str. 2, 94481 Grafenau, Germany

Rate of tree carbon accumulation increases continuously with tree size

N. L. Stephenson¹, A. J. Das¹, R. Condit², S. E. Russo³, P. J. Baker⁴, N. G. Beckman^{3†}, D. A. Coomes⁵, E. R. Lines⁶, W. K. Morris⁷, N. Rüger^{2,8†}, E. Álvarez⁹, C. Blundo¹⁰, S. Bunyavejchewin¹¹, G. Chuyong¹², S. J. Davies¹³, Á. Duque¹⁴, C. N. Ewango¹⁵, O. Flores¹⁶, J. F. Franklin¹⁷, H. R. Grau¹⁰, Z. Hao¹⁸, M. E. Harmon¹⁹, S. P. Hubbell^{2,20}, D. Kenfack¹³, Y. Lin²¹, J. -R. Makana¹⁵, A. Malizia¹⁰, L. R. Malizia²², R. J. Pabst¹⁹, N. Pongpattananurak²³, S.-H. Su²⁴, I.-F. Sun²⁵, S. Tan²⁶, D. Thomas²⁷, P. J. van Mantgem²⁸, X. Wang¹⁸, S. K. Wiser²⁹ & M. A. Zavala³⁰

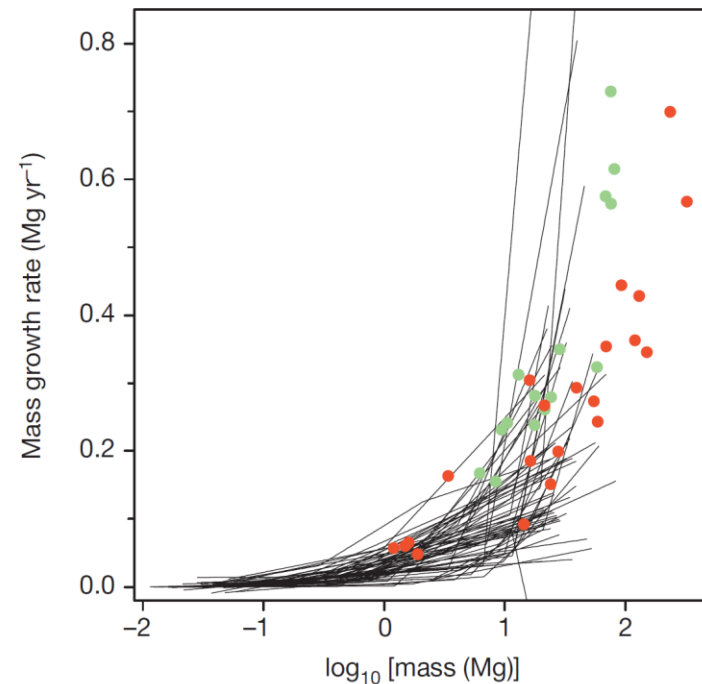


Figure 3 | Aboveground mass growth rates of species in our data set compared with *E. regnans* and *S. sempervirens*. For clarity, only the 58 species in our data set having at least one tree exceeding 20 Mg are shown (lines). Data for *E. regnans* (green dots, 15 trees) and *S. sempervirens* (red dots, 21 trees) are from an intensive study that included some of the most massive individual trees on Earth⁷. Both axes are expanded relative to those of Fig. 2.

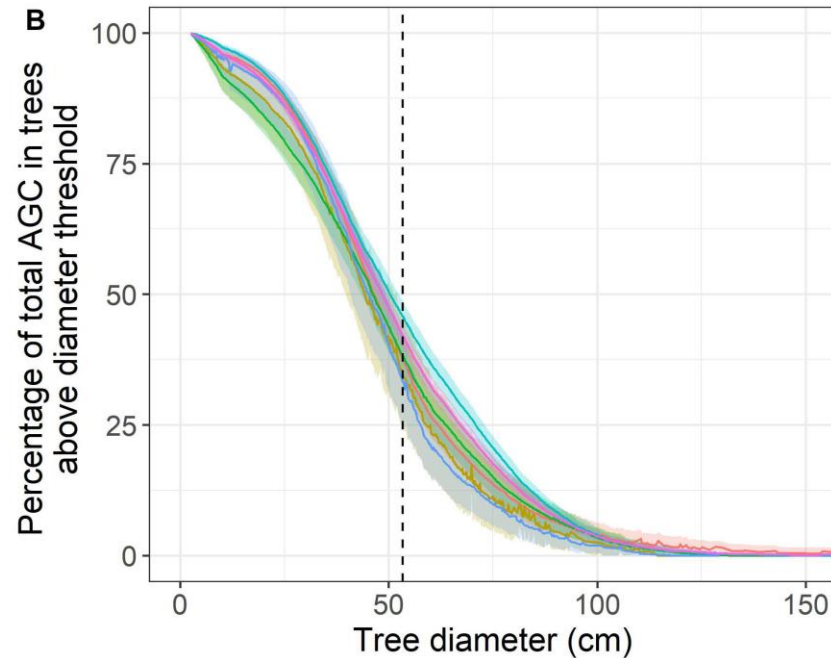
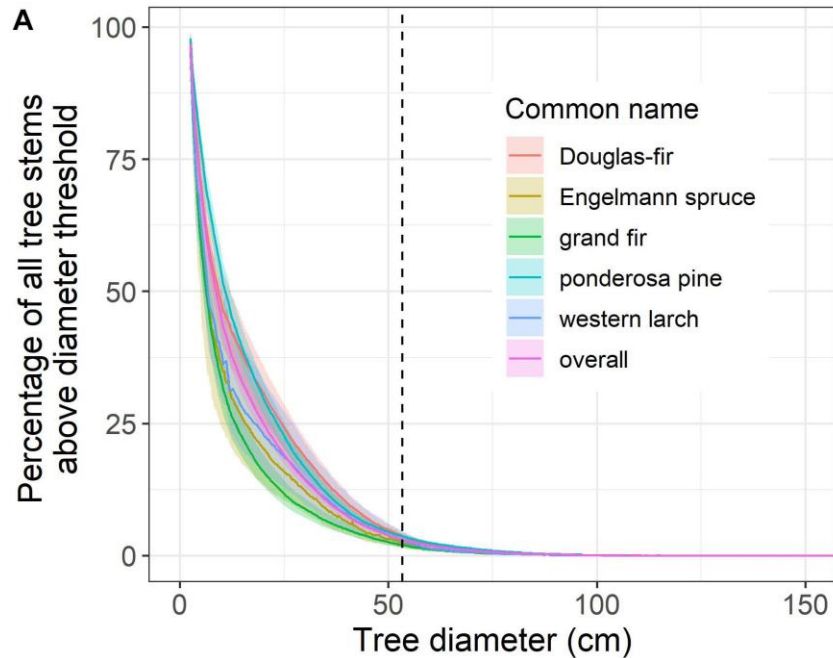
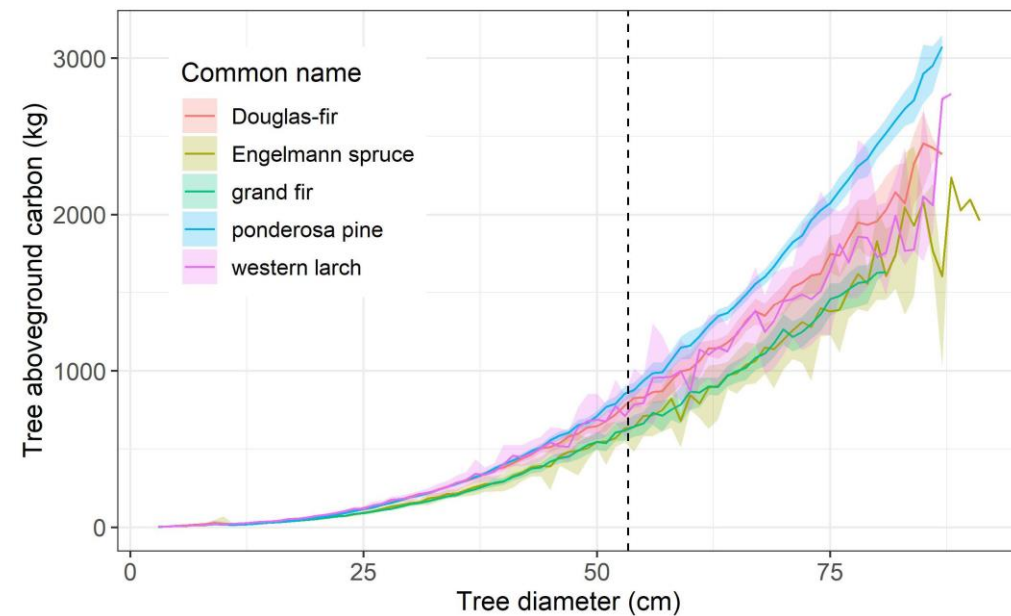
ORIGINAL RESEARCH article

Front. For. Glob. Change, 05 November 2020 | <https://doi.org/10.3389/ffgc.2020.594274>



Large Trees Dominate Carbon Storage in Forests East of the Cascade Crest in the United States Pacific Northwest

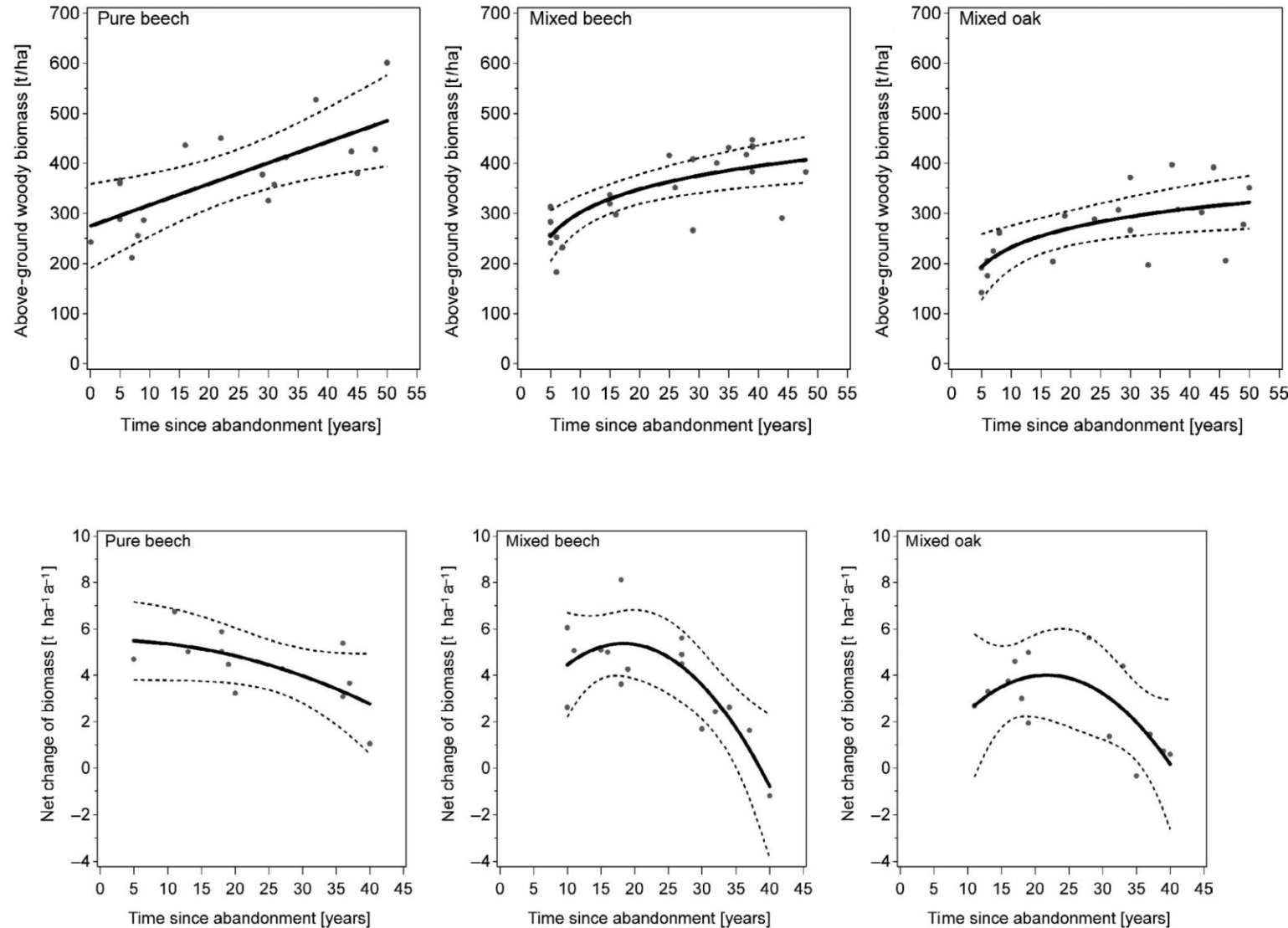
David J. Mildrexler^{1*}, Logan T. Berner², Beverly E. Law³, Richard A. Birdsey⁴ and William R. Moomaw^{4,5}



Dinamiche demografiche della comunità arborea

Limited sink but large storage: Biomass dynamics in naturally developing beech (*Fagus sylvatica*) and oak (*Quercus robur*, *Quercus petraea*) forests of north-western Germany

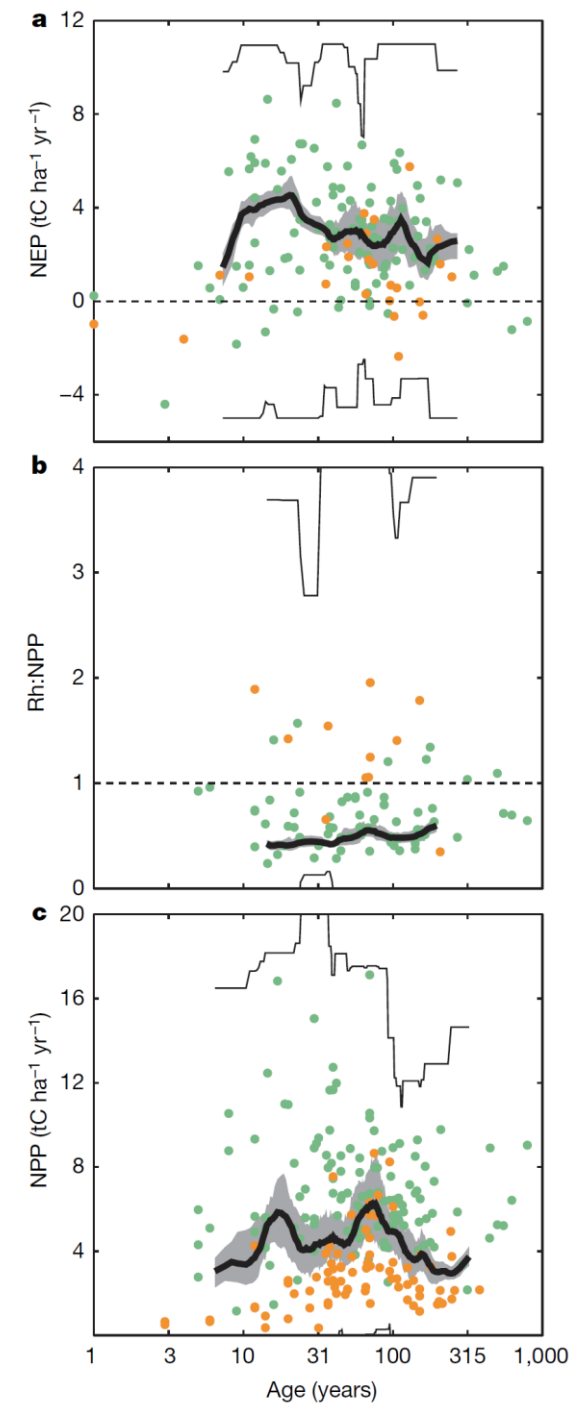
Peter Meyer  | Rouven Nagel  | Eike Feldmann 



LETTERS

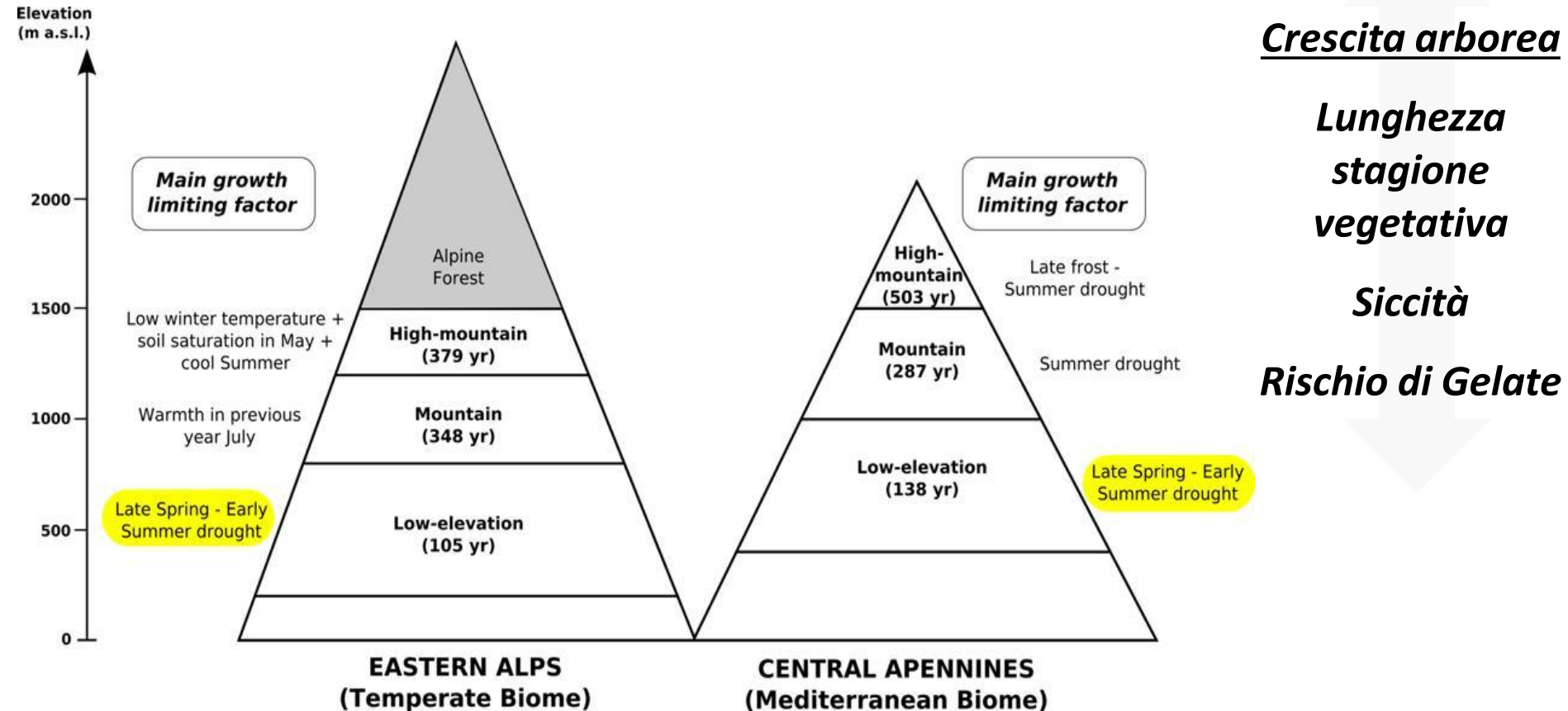
Old-growth forests as global carbon sinks

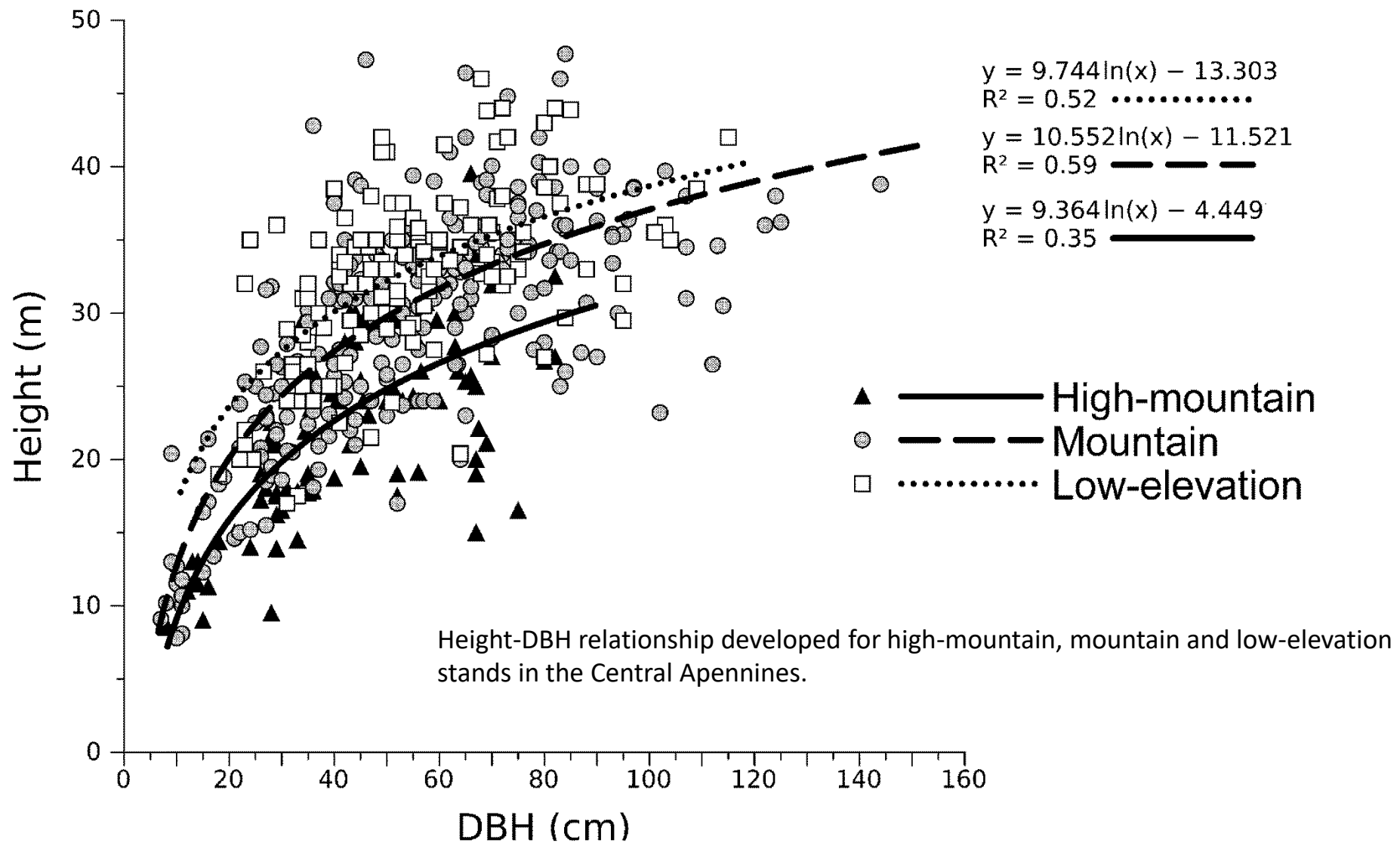
Sebastiaan Luyssaert^{1,2}, E. -Detlef Schulze³, Annett Börner³, Alexander Knohl⁴, Dominik Hessenmöller³, Beverly E. Law², Philippe Ciais⁵ & John Grace⁶





Caratterizzare variabilità di strutture e processi lungo gli ampi gradienti ambientali coperti dalle faggete

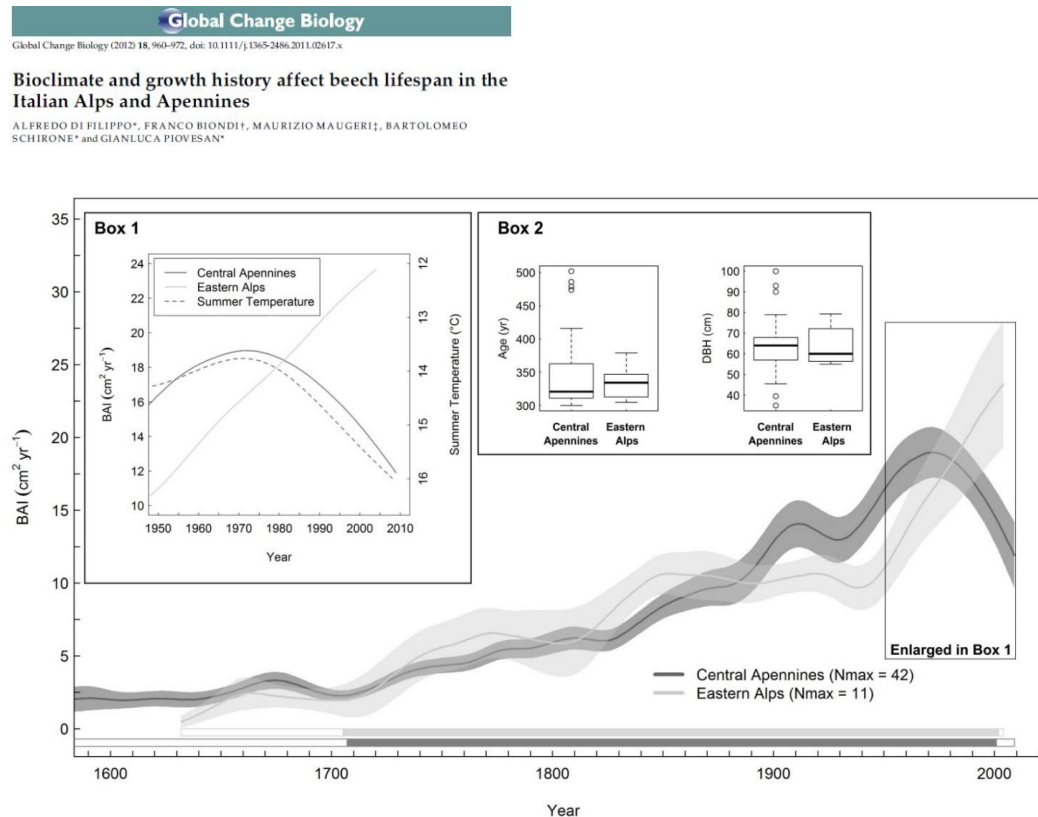




Bioclimatic position as an important selection criterium.

Since elevation can strongly influence attributes like age and stature, which are related to various sets of structural indicators as well as ecosystem processes, we recommend considering different bioclimatic units as important criteria in the selection of the proposed stands.

Impatto dei CC sulle dinamiche forestali → cambiamenti nella struttura e demografia delle comunità arboree



ARTICLE

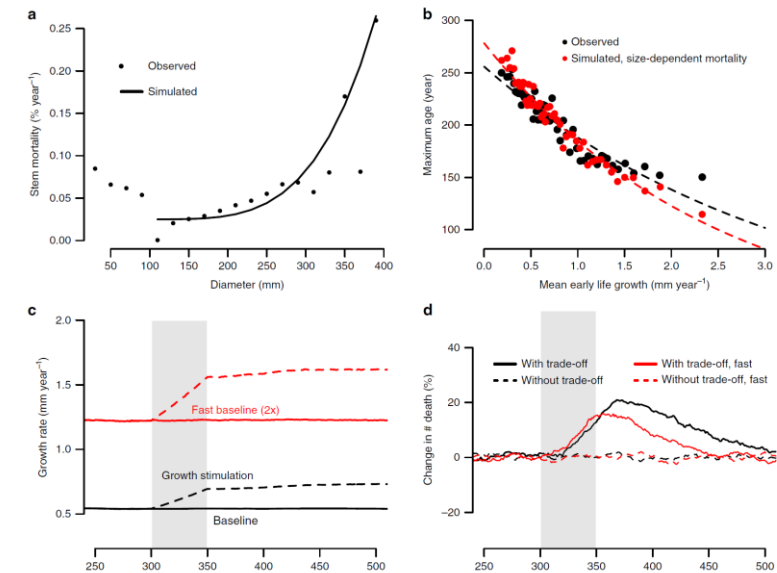
<https://doi.org/10.1038/s41467-020-17966-z>

OPEN

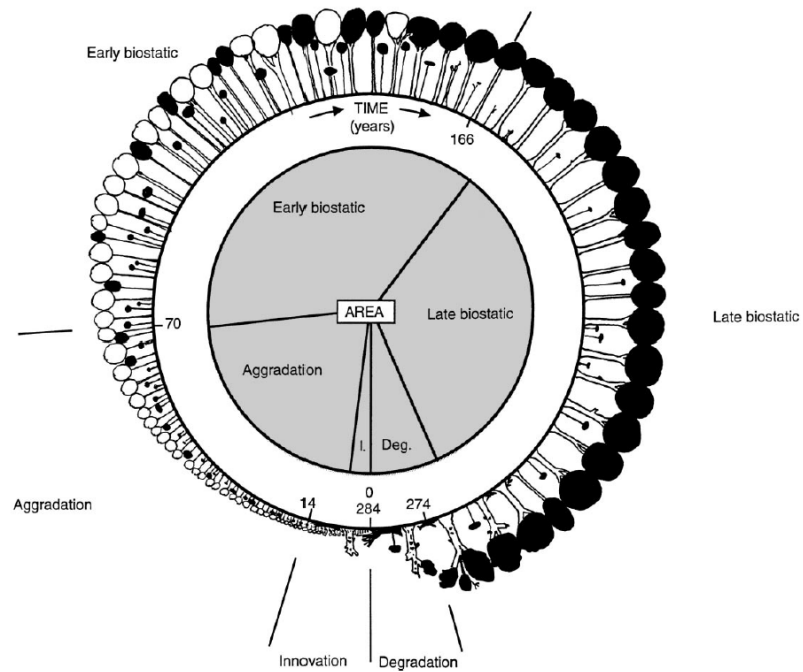
Check for updates

Forest carbon sink neutralized by pervasive growth-lifespan trade-offs

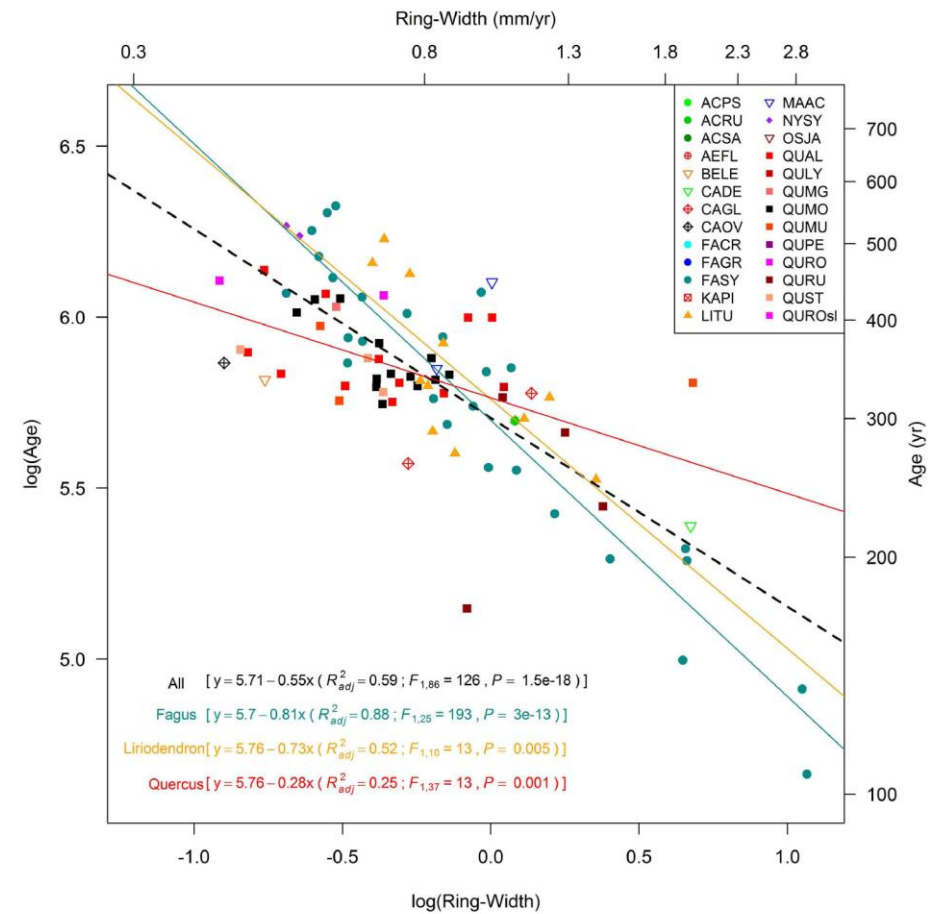
R. J. W. Brien¹, L. Caldwell¹, L. Duchesne², S. Voelker³, J. Barichivich^{4,5}, M. Baliva⁶, G. Ceccantini⁷, A. Di Filippo⁶, S. Helama⁸, G. M. Locosselli⁷, L. Lopez⁹, G. Piovesan⁶, J. Schöngart¹⁰, R. Villalba⁹ & E. Gloor¹



La longevità arborea



J. Emborg et al. / Forest Ecology and Management 126 (2000) 173–189



frontiers
in Ecology and Evolution

The longevity of broadleaf deciduous trees in Northern Hemisphere temperate forests: insights from tree-ring series

Alfredo Di Filippo¹, Neil Pederson², Michele Baliva¹, Michele Brunetti³, Anna Dinella¹, Keiko Kitamura⁴, Hanns D. Knapp⁵, Bartolomeo Schirone¹ and Gianluca Piovesan^{1*}

Forestry contributed to warming of forest ecosystems in northern Germany during the extreme summers of 2018 and 2019

Jeanette S. Blumröder¹ | Felix May² | Werner Härdtle³ | Pierre L. Ibisch¹

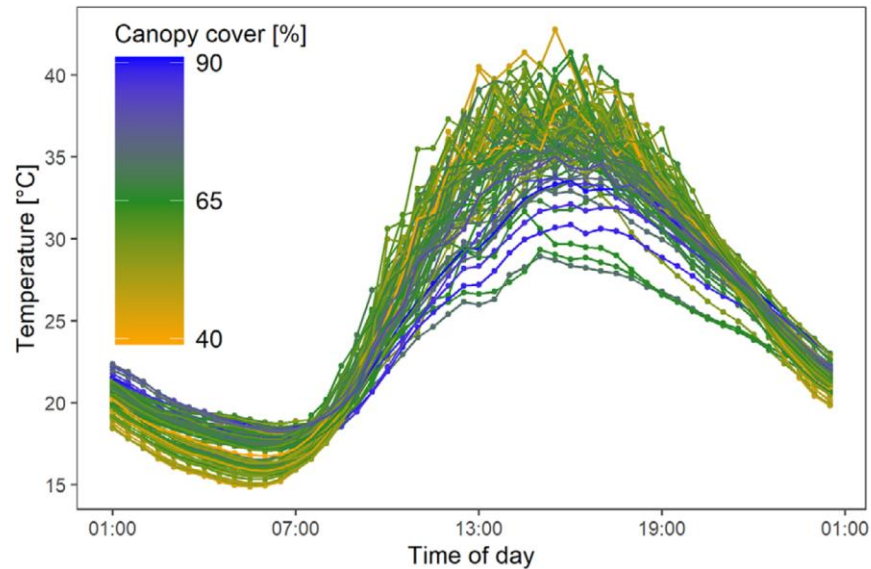
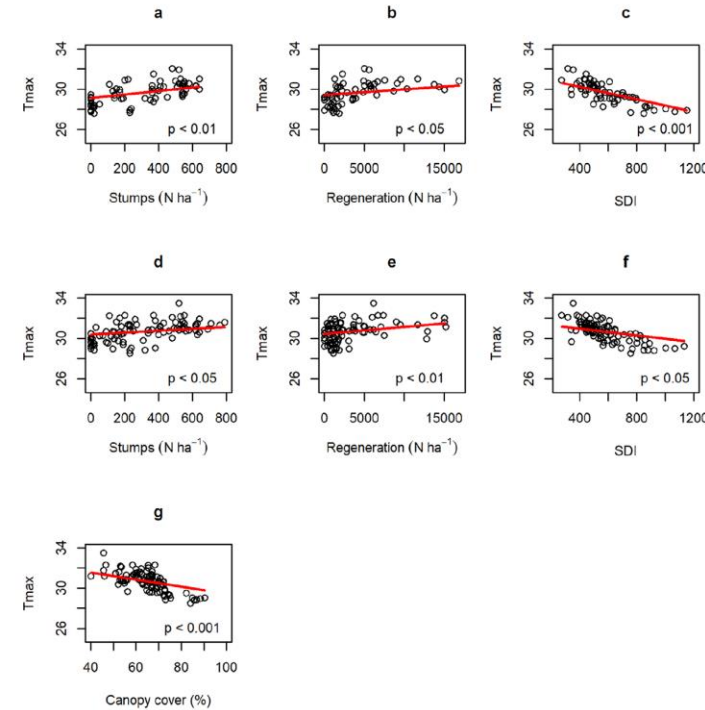


FIGURE 6 Diurnal temperature variation on the hottest day in the year 2019 measured in pine-dominated sample plots ($n = 88$) at ground-level

Monitoraggio del microclima forestale



- Capacità di mitigare le temperature estreme varia con il grado di naturalità della foresta

Tree ring-based metrics for assessing old-growth forest naturalness

Alfredo Di Filippo^{1*}, Franco Biondi², Gianluca Piovesan¹ and Emanuele Ziaco^{1,2}

Indicatori di processo

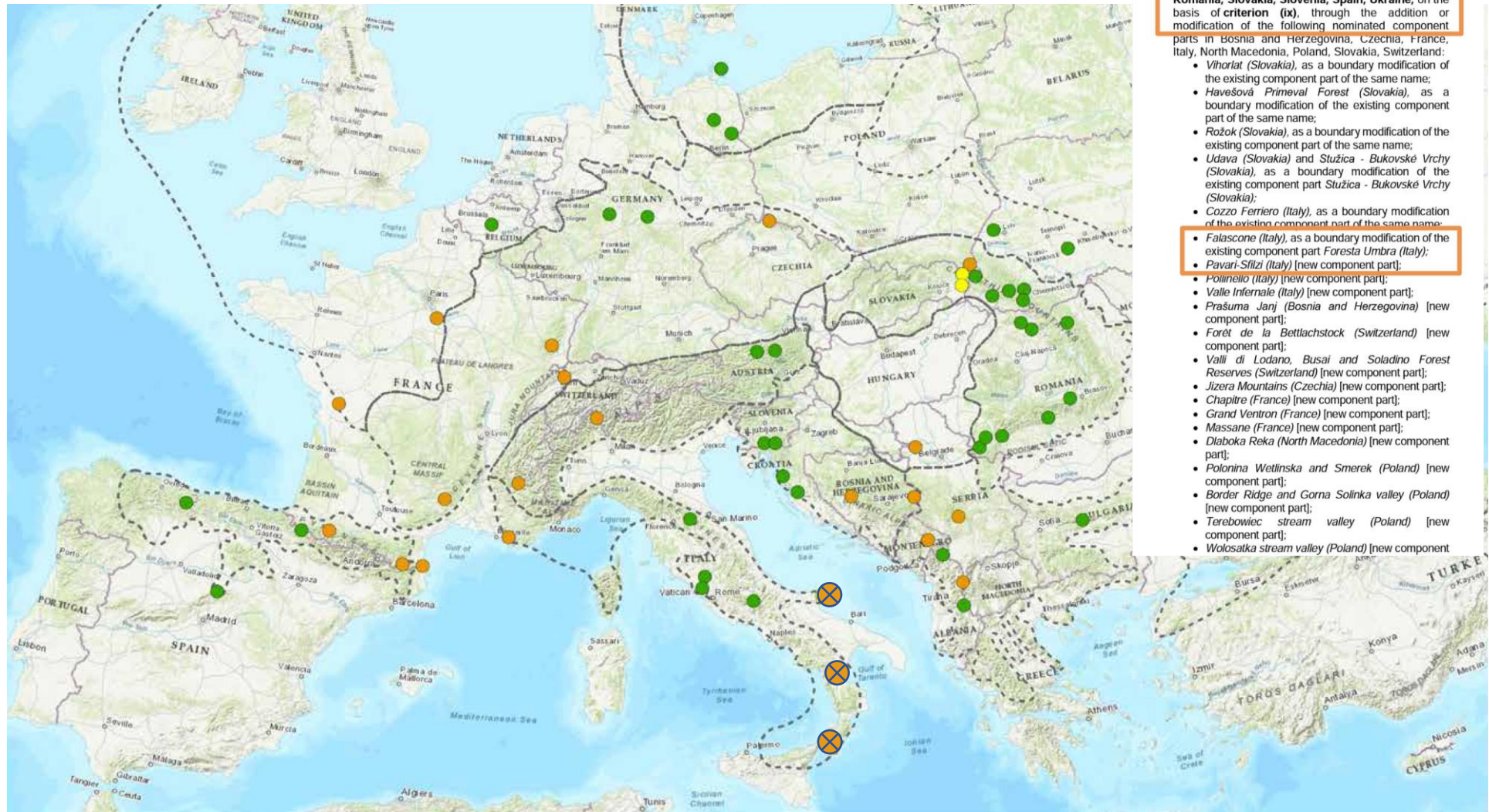
2-5 volte superiori in OG primarie rispetto a secondarie e gestite (*a parità di condizioni ambientali*)

	Metric	Unit	High-mountain		Mountain	Low-elevation
			OG1	OG2	OG2	OG2
SCI	Gini Coefficient	-	74-80	56-65	39-58	37-42
AI	MEAN	years	312-385	216-308	136-284	83-110
	RANGE3	years	322-371	105-257	74-199	49-57
	AGE3	years	514-528	342-435	185-320	114-132
	MAX	years	548-559	348-520	220-351	115-136
GHI	ForkRANGE3	years	266-268	110-185	70-95	46-74
	ForkSLOW3	years	360-397	242-309	100-243	66-106
DSI	Rel1Yr.D	-	82-90	83-90	53-79	68-73
	SupN.5	n	4.0-5.2	3.0-4.4	1.2-3.0	1.4-1.6
	SupL.5	years	70-117	49-77	14-36	10-21

SCI: Structural Complexity Indices. AI, GHI, DSI: Age, Growth History, Disturbance-Suppression Indicators.

Campo di variazione dei principali attributi crono-funzionali delle faggete vetuste a seconda fascia bioclimatica: alto montana; montana; basale. OG1 e OG2: foresta vetusta primaria o secondaria

Ancient and primeval Beech Forests (2021) - 1133quater



7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee adopts the following draft decision:

The World Heritage Committee,

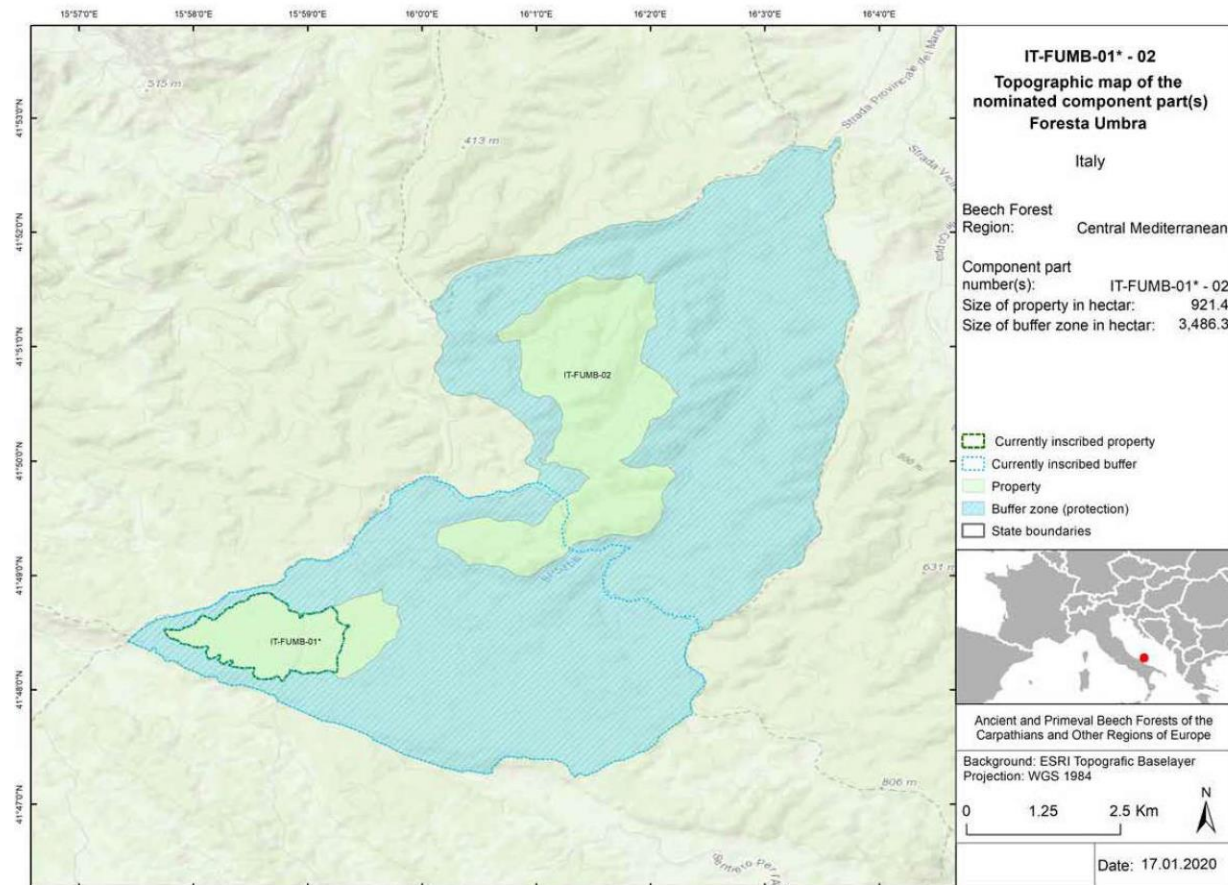
1. Having examined Documents WHC/21/44.COM/8B and WHC/21/44.COM/INF.8B2,

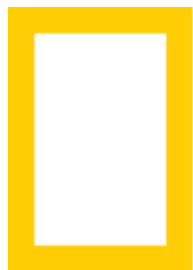
2. Recalling decisions 31 COM 8B.16, 35 COM 8B.13, 41 COM 8B.7, 42 COM 7B.71 and 43 COM 7B.13 adopted at its 31st (Christchurch, 2007), 35th (UNESCO Headquarters, 2011), 41st (Krakow, 2017), 42nd (Manama, 2018) and 43rd (Baku, 2019) sessions respectively,

3. Approves the significant boundary modification of the **Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe, Albania, Austria, Belgium, Bulgaria, Croatia, Germany, Italy, Romania, Slovakia, Slovenia, Spain, Ukraine**, on the basis of **criterion (ix)**, through the addition or modification of the following nominated component parts in Bosnia and Herzegovina, Czechia, France, Italy, North Macedonia, Poland, Slovakia, Switzerland:

- **Vihorlat (Slovakia)**, as a boundary modification of the existing component part of the same name;
- **Havešová Primeval Forest (Slovakia)**, as a boundary modification of the existing component part of the same name;
- **Rožok (Slovakia)**, as a boundary modification of the existing component part of the same name;
- **Udava (Slovakia)** and **Stužica - Bukovské Vrchy (Slovakia)**, as a boundary modification of the existing component part **Stužica - Bukovské Vrchy (Slovakia)**;
- **Cozzo Ferriero (Italy)**, as a boundary modification of the existing component part of the same name;
- **Falascione (Italy)**, as a boundary modification of the existing component part **Foresta Umbra (Italy)**;
- **Pavari-Slizi (Italy)** [new component part];
- **Polinello (Italy)** [new component part];
- **Valle Infernale (Italy)** [new component part];
- **Prašuma Janj (Bosnia and Herzegovina)** [new component part];
- **Forêt de la Bettlachstock (Switzerland)** [new component part];
- **Valli di Lodano, Busai and Soladino Forest Reserves (Switzerland)** [new component part];
- **Jizera Mountains (Czechia)** [new component part];
- **Chapitre (France)** [new component part];
- **Grand Ventron (France)** [new component part];
- **Massane (France)** [new component part];
- **Dlaboka Reka (North Macedonia)** [new component part];
- **Polonina Wetlińska and Smerek (Poland)** [new component part];
- **Border Ridge and Gorna Solinka valley (Poland)** [new component part];
- **Terebowiec stream valley (Poland)** [new component part];
- **Wolosatka stream valley (Poland)** [new component part];

Foresta Umbra - Cluster Falascone (2017) Pavari-Sfilzi (2021)





NATIONAL GEOGRAPHIC

