



**RETE LOMBARDA PER LO  
SVILUPPO SOSTENIBILE**

**QUARTO INCONTRO FORMATIVO  
LUNEDÌ 13 GENNAIO  
16.15-18.30  
CASA AMADEI, VIA  
S. BERNARDINO, 77 BERGAMO**



## Biodiversità ed Energia

**Gabriele Rinaldi**

Direttore dell'Orto botanico di Bergamo



**Orto Botanico  
di Bergamo  
Lorenzo Rota**

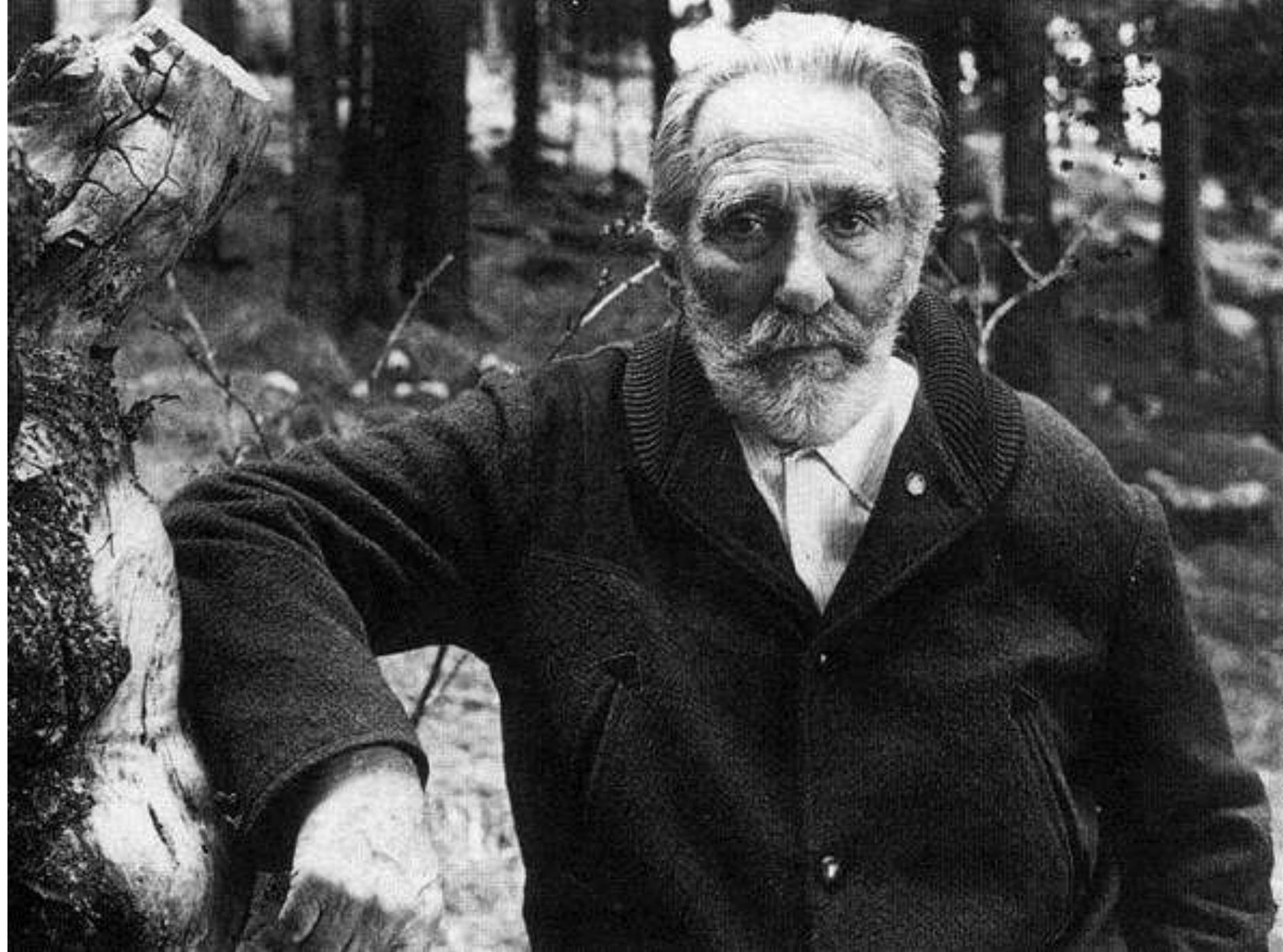
«Chi conosce la scienza sente che un pezzo di musica e un albero hanno qualcosa in comune, che l'uno e l'altro sono creati da leggi egualmente logiche e semplici».



*Il giardino dei ciliegi, 1903*

Anton Pavlovič Čechov  
Taganrog, 29 gennaio 1860 – Badenweiler, 15  
luglio 1904

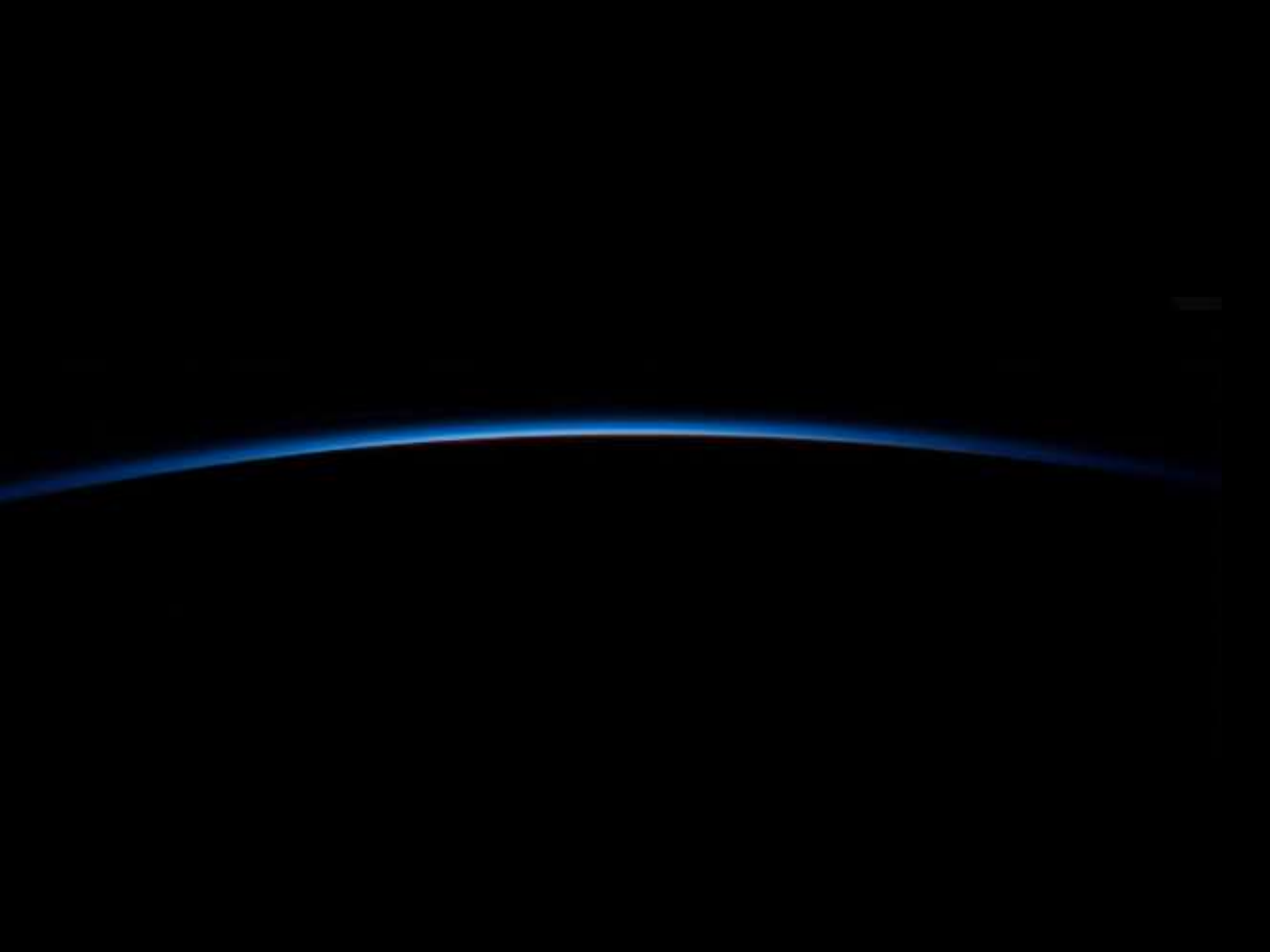
«*primo autore ecologico d'Europa*»



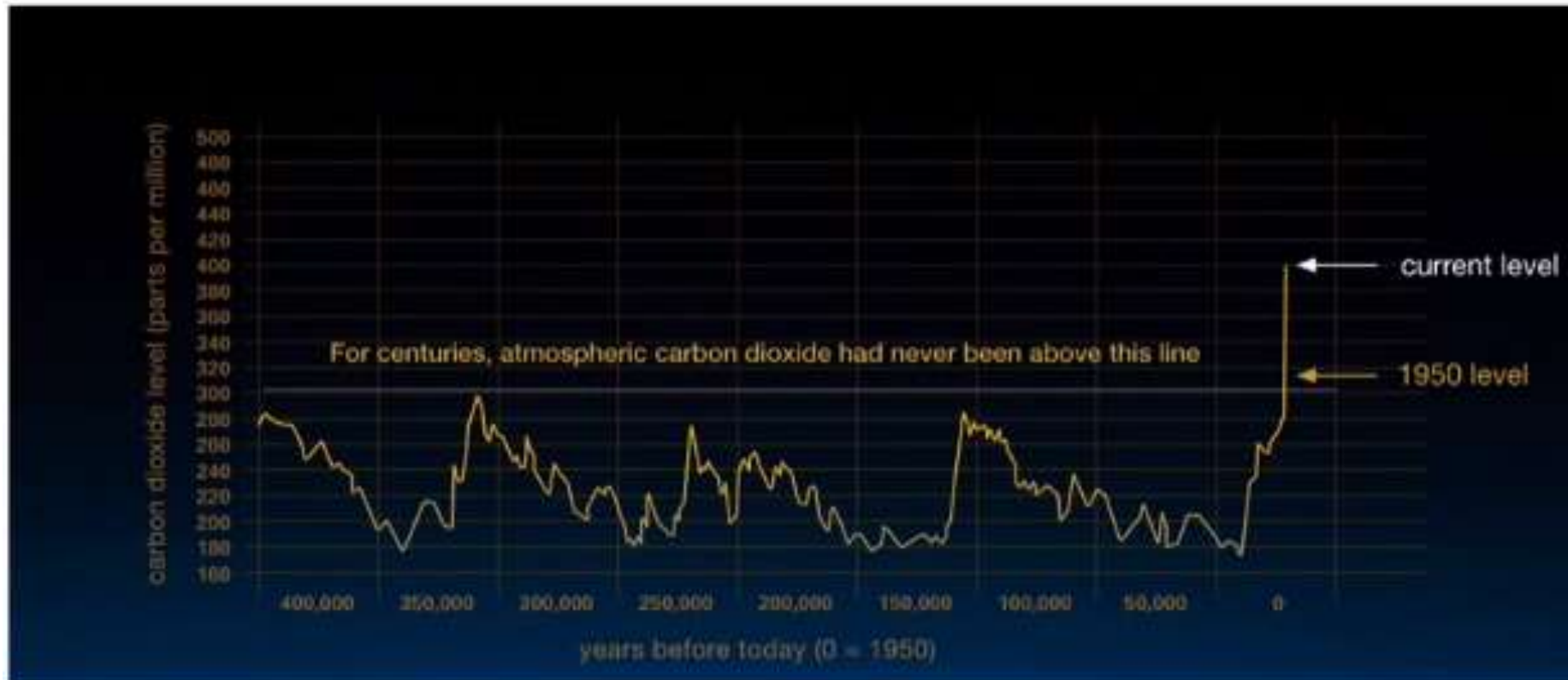




Novembre 2018



# Una nuova atmosfera



Fonte: NASA



VIVERE E COMBATTERE IL CAMBIAMENTO CLIMATICO

6 ottobre 2019 ore 15.00



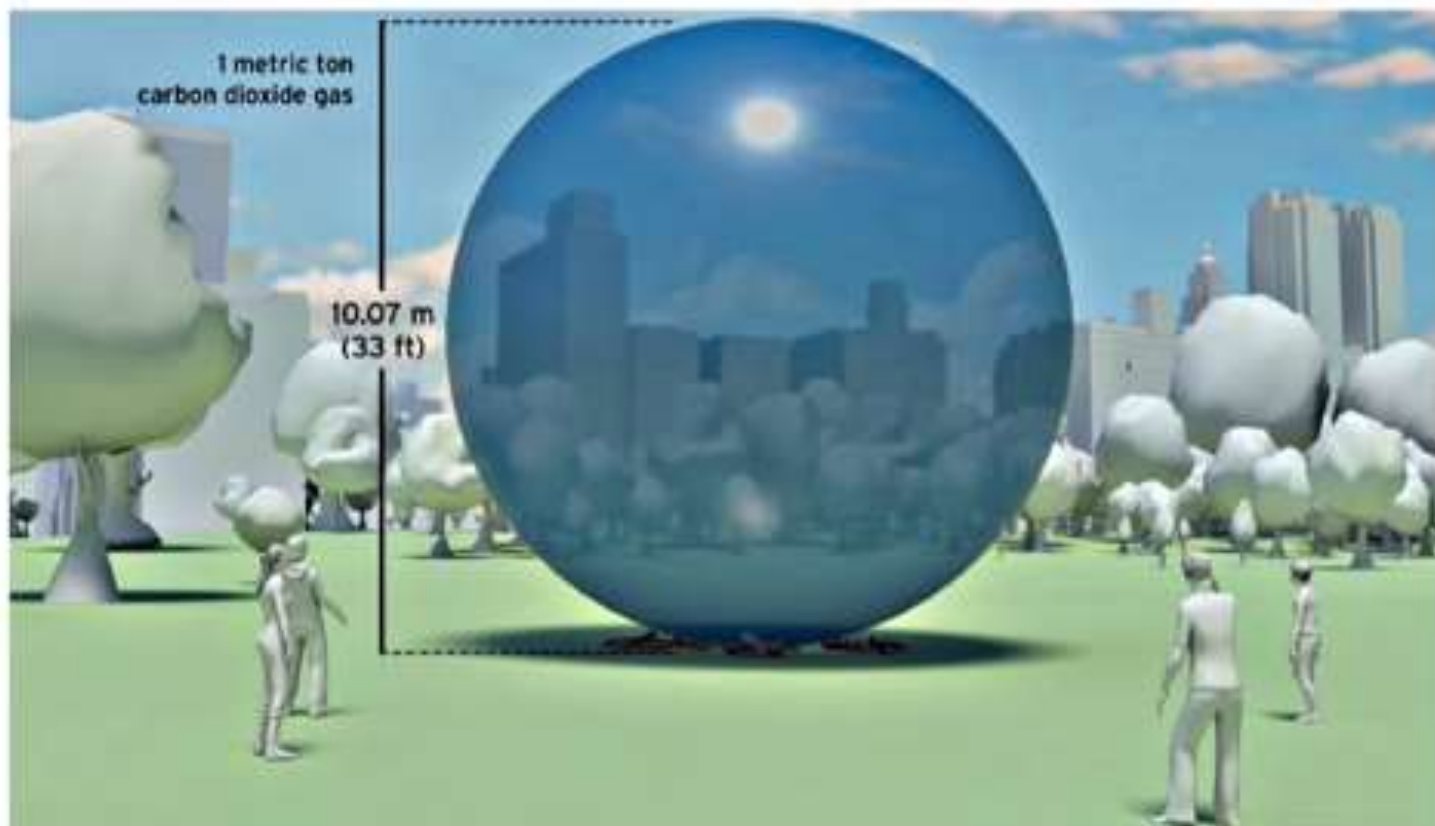
PAZIENTE TERRA. LA SALUTE DEL PIANETA VISTA DALLO SPAZIO

6 ottobre 2019 ore 11.30

Oggi 407 ppm  
+ 2 ppm/anno

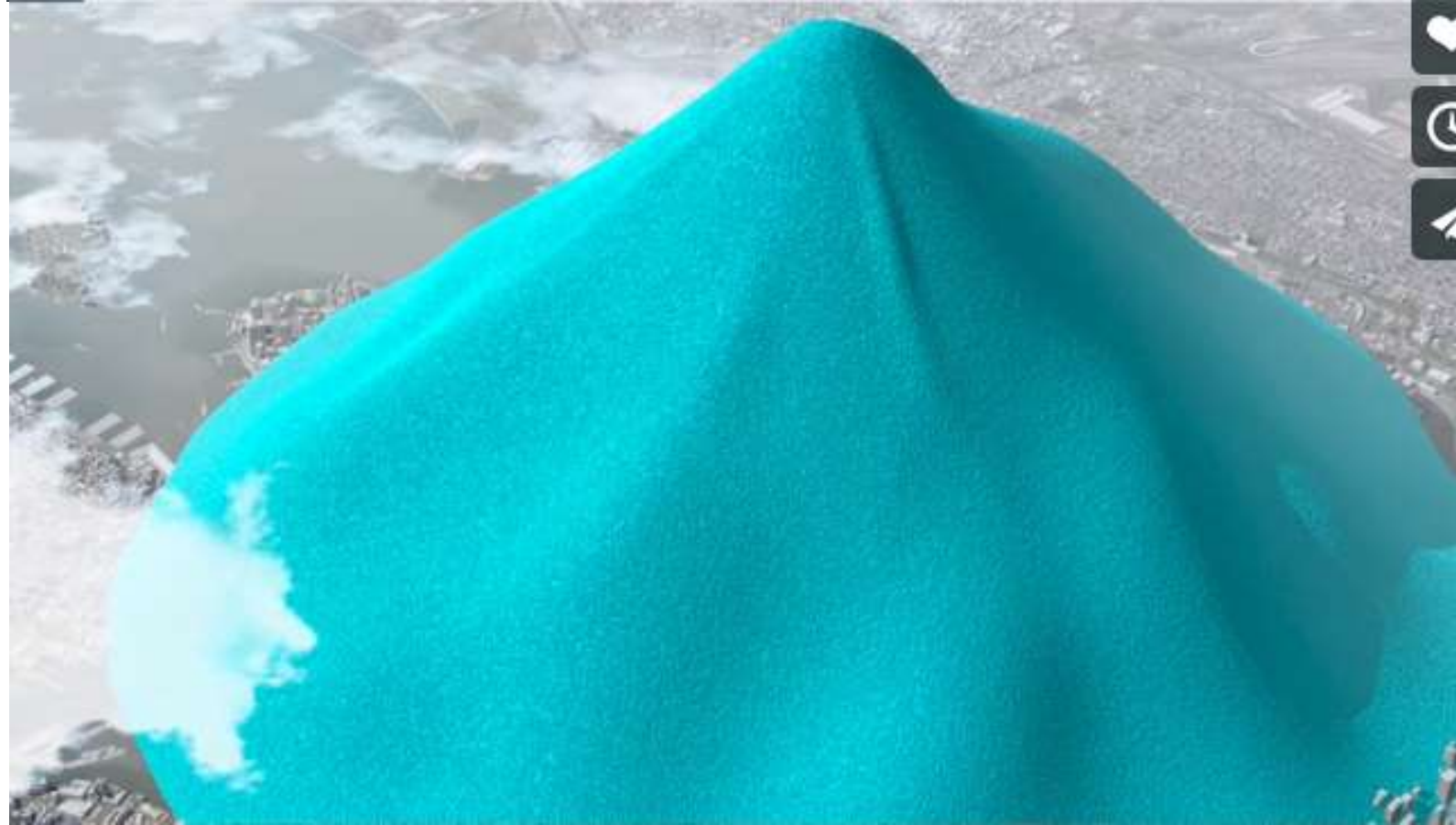
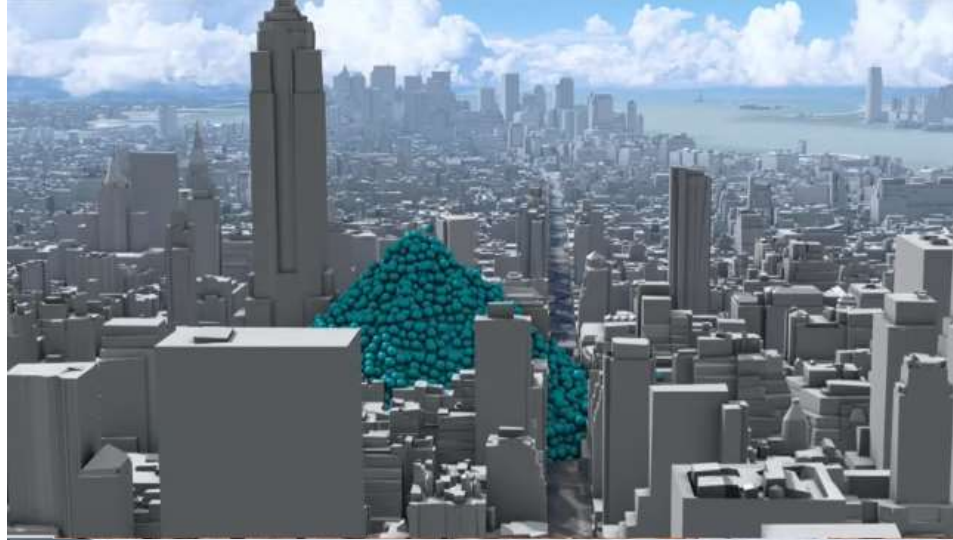
Cosa succederà ? Rischi 18:00

# 1tCO<sub>2</sub>







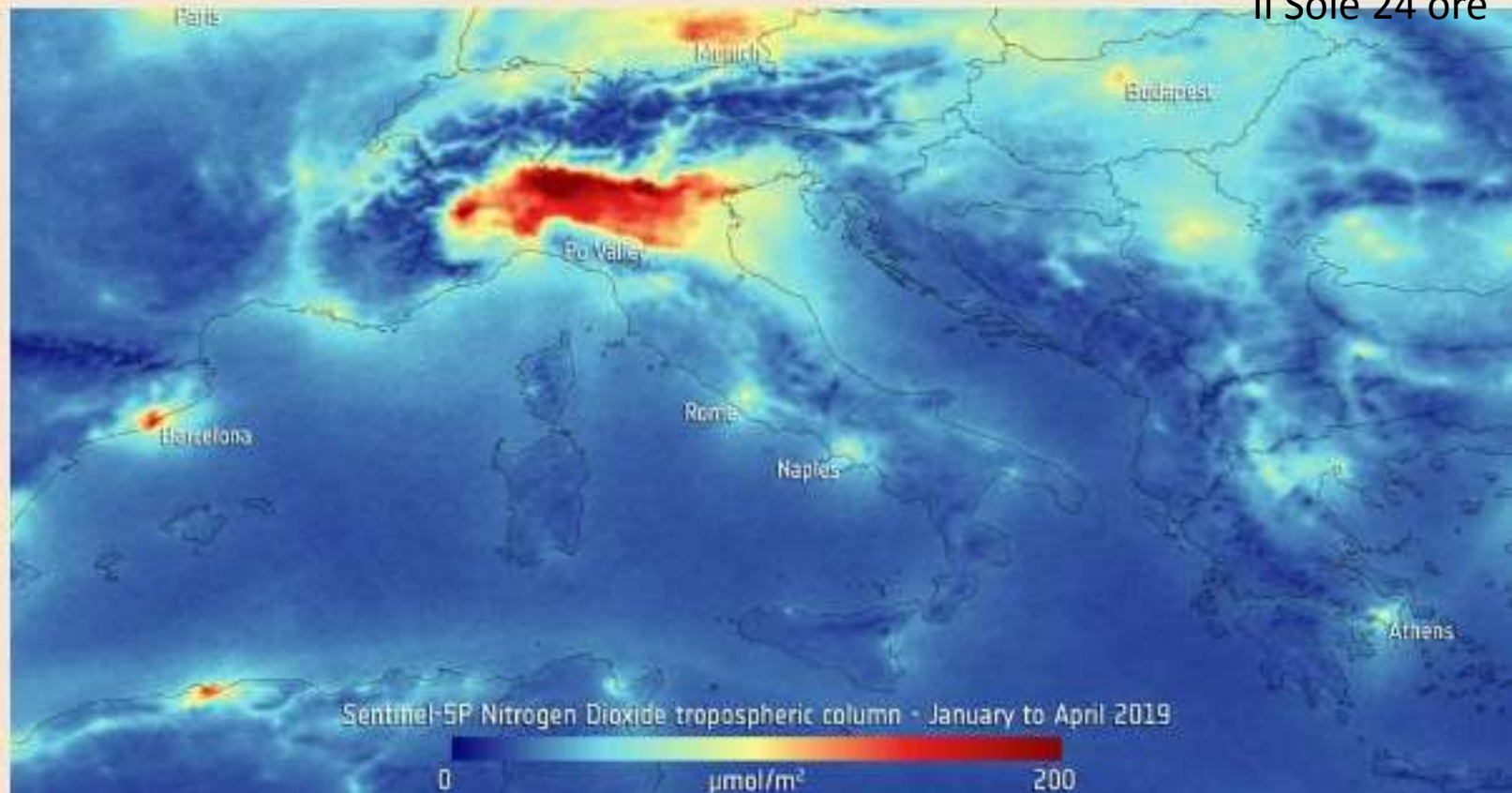


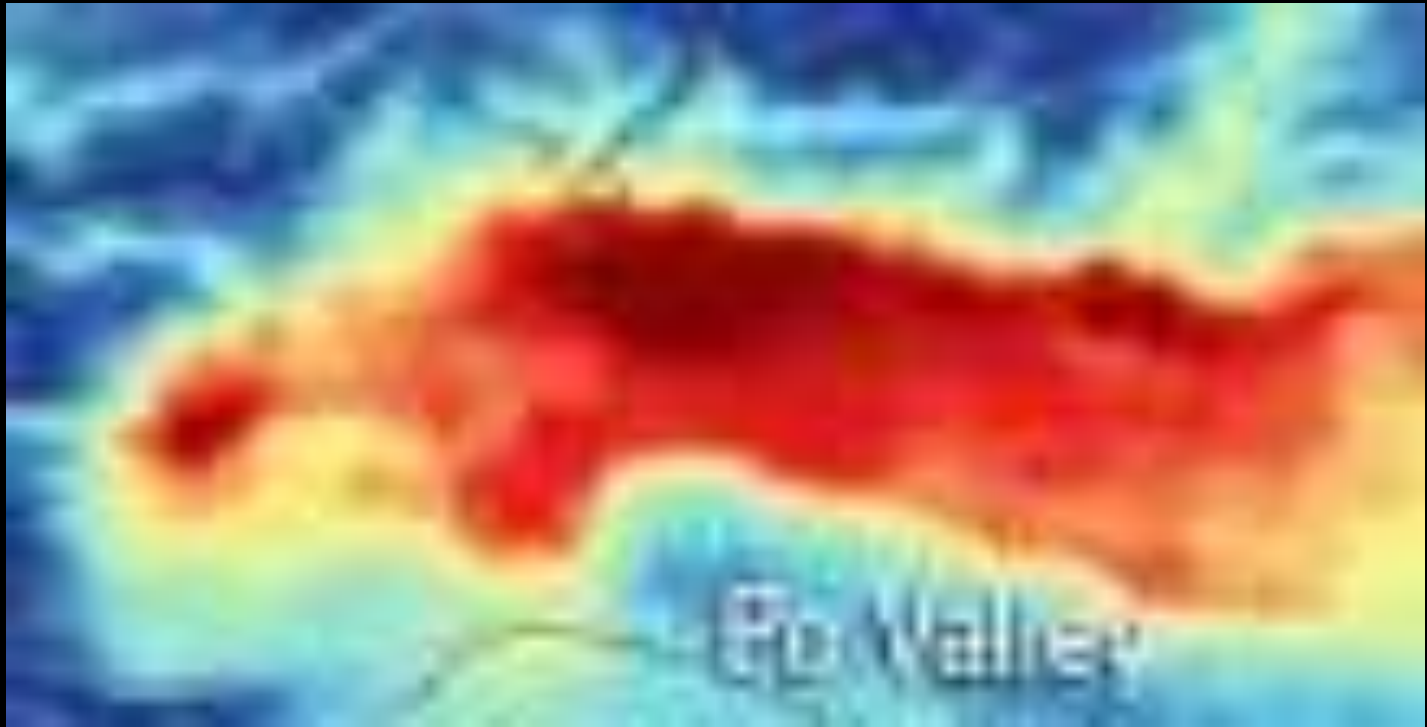
L'IMMAGINE DI COPERNICUS

# Inquinamento, foto shock: pianura padana (con smog) vista dal satellite

di Jacopo Giliberto

Il Sole 24 ore





la Repubblica

News

f t in

# Allarme di 11mila scienziati: è emergenza clima, sei cose da fare subito per uscire dalla crisi

S&T Terra&Poli

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ARTICOLI • Scienze/tecnologia • Terra&Poli • L'allarme di 11mila ricercatori, la Terra è in piena emergenza clima

## L'allarme di 11mila ricercatori, la Terra è in piena emergenza clima

Rischio di 'indicibili sofferenze umane', la proposta di 6 azioni

Divide Patrucco - ROMA, 06 novembre 2019 10:08

The Guardian

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## Climate crisis: 11,000 scientists warn of 'untold suffering'

Statement sets out 'vital signs' as indicators of magnitude of the climate emergency

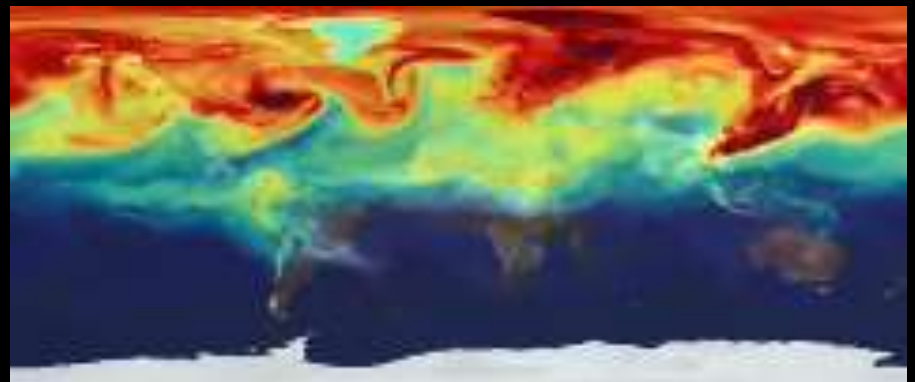
Most countries' climate plans 'totally inadequate' - experts

World Africa Americas Asia Australia China Europe India Middle East United Kingdom

## 11,000 scientists warn of 'untold suffering' caused by climate change

By Emma Tobias and Ivana Kolbasova, CNN

Updated 09:34 GMT (20:04 HKT) November 6, 2019



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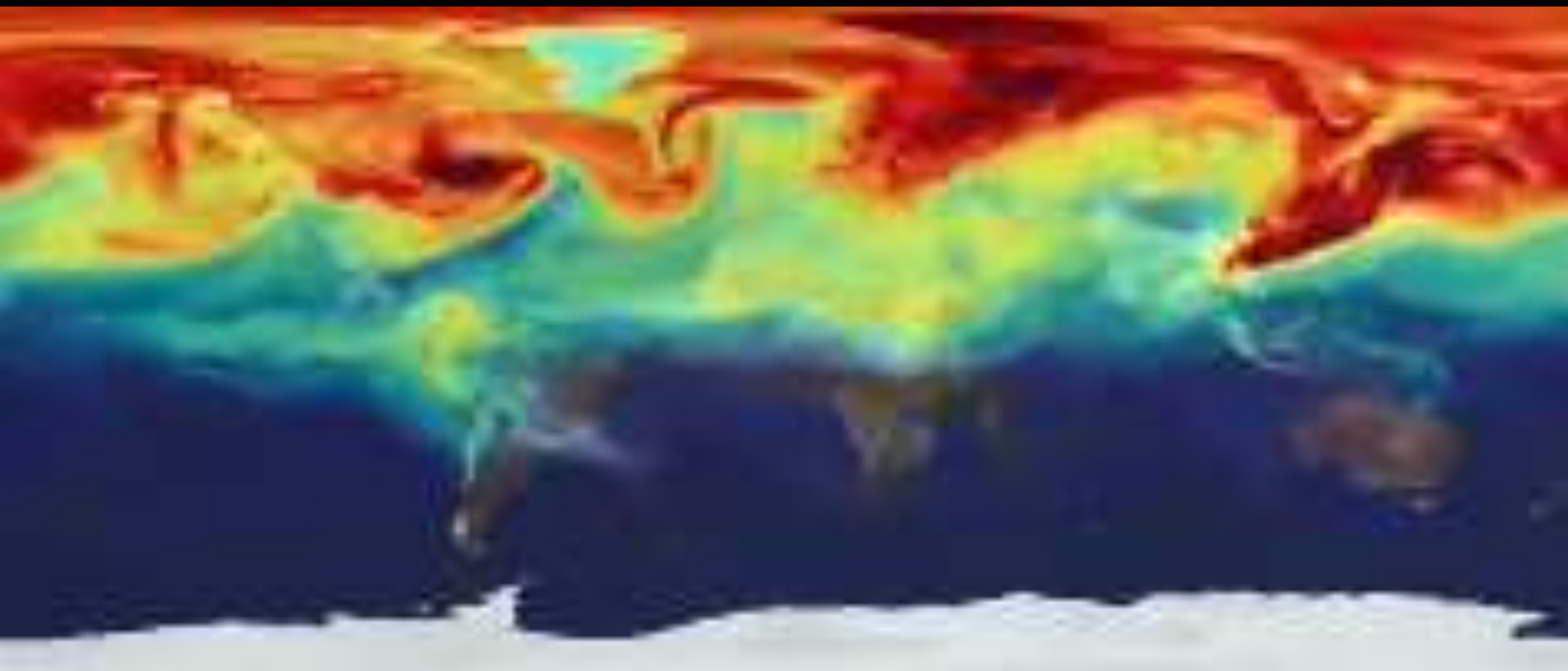
Science & Environment

## Climate change: 'Clear and unequivocal' emergency, say scientists

By Matt McGrath  
Environment correspondent

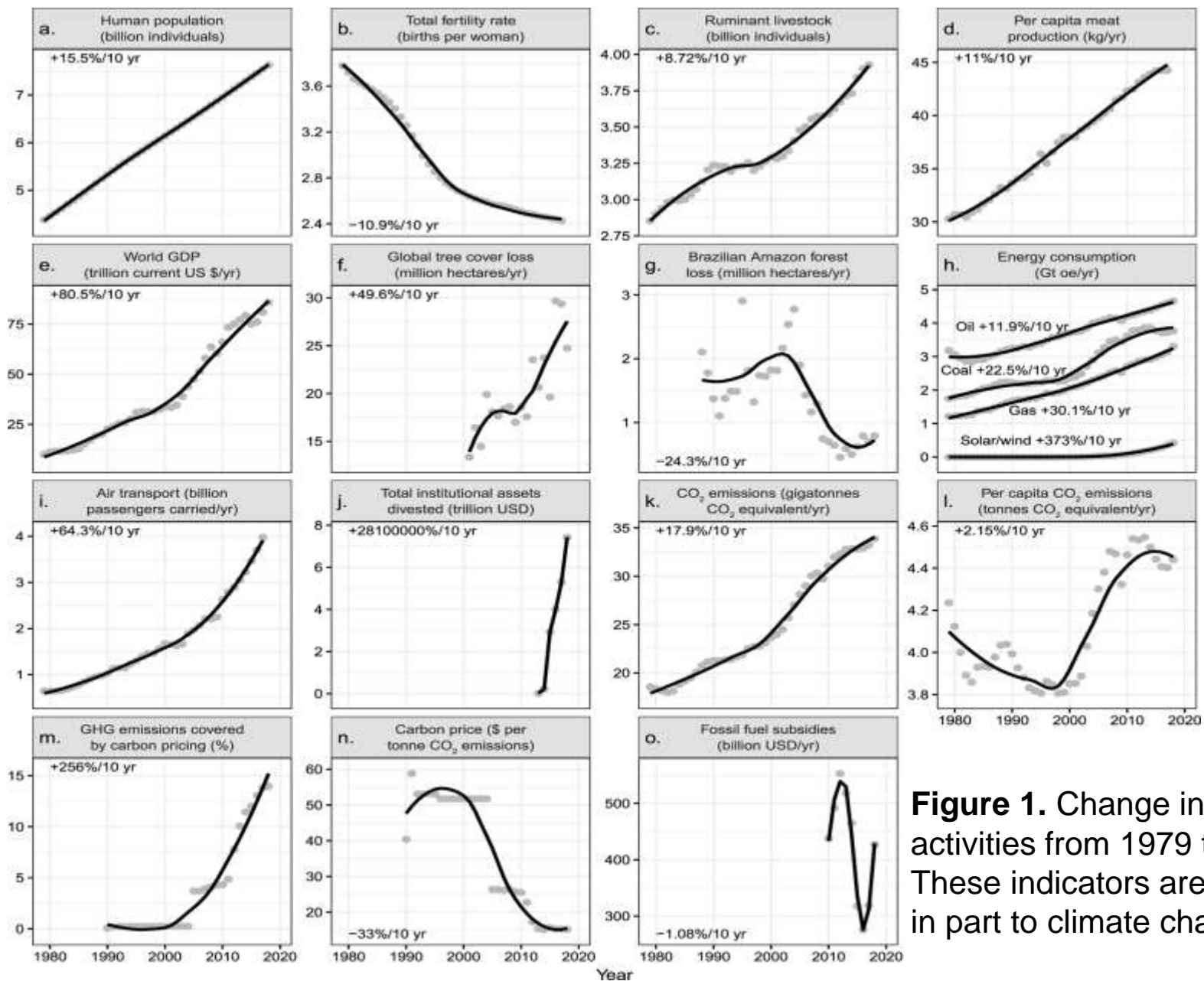
© 6 November 2019 2340

f t in





Una nuova atmosfera



**Figure 1.** Change in global human activities from 1979 to the present. These indicators are linked at least in part to climate change.

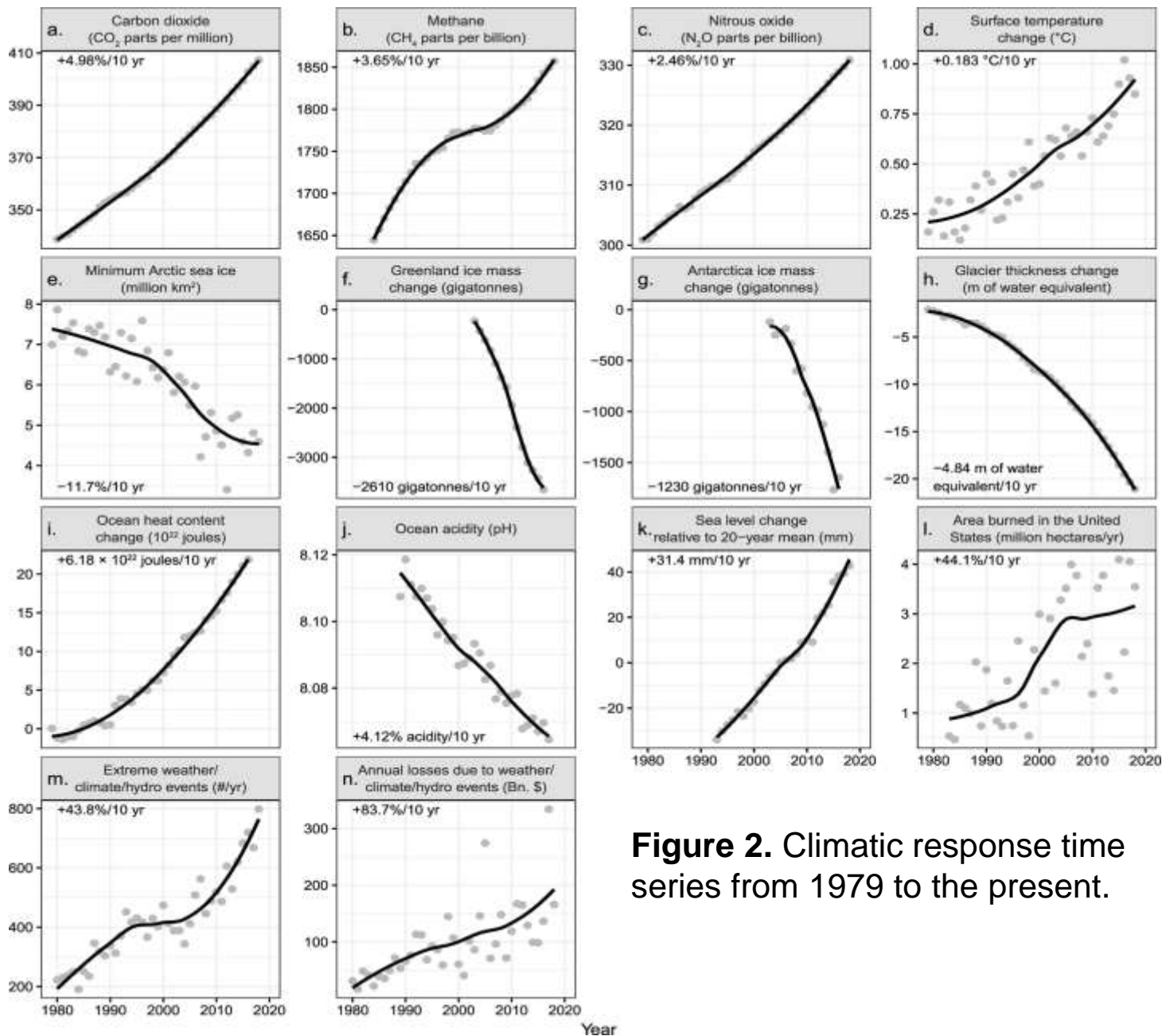
BioScience, biz088, <https://doi.org/10.1093/biosci/biz088>

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# Nature

We must protect and restore Earth's ecosystems. **Phytoplankton, coral reefs, forests, savannas, grasslands, wetlands, peatlands, soils, mangroves, and sea grasses contribute greatly to sequestration of atmospheric CO<sub>2</sub>.** Marine and terrestrial plants, animals, and microorganisms play significant roles in carbon and nutrient cycling and storage. We need to quickly curtail habitat and biodiversity loss (figure 1f–1g), **protecting** the remaining primary and intact forests, especially those with high carbon stores and other forests with the capacity to rapidly sequester carbon (proforestation), while **increasing** reforestation and afforestation where appropriate at enormous scales. Although available land may be limiting in places, up to a third of emissions reductions needed by 2030 for the Paris agreement (less than 2°C) could be obtained with these natural climate solutions (Griscom et al. 2017).



**Figure 2.** Climatic response time series from 1979 to the present.



40 000 000 000  
tCO2 per anno



The Paris Agreement

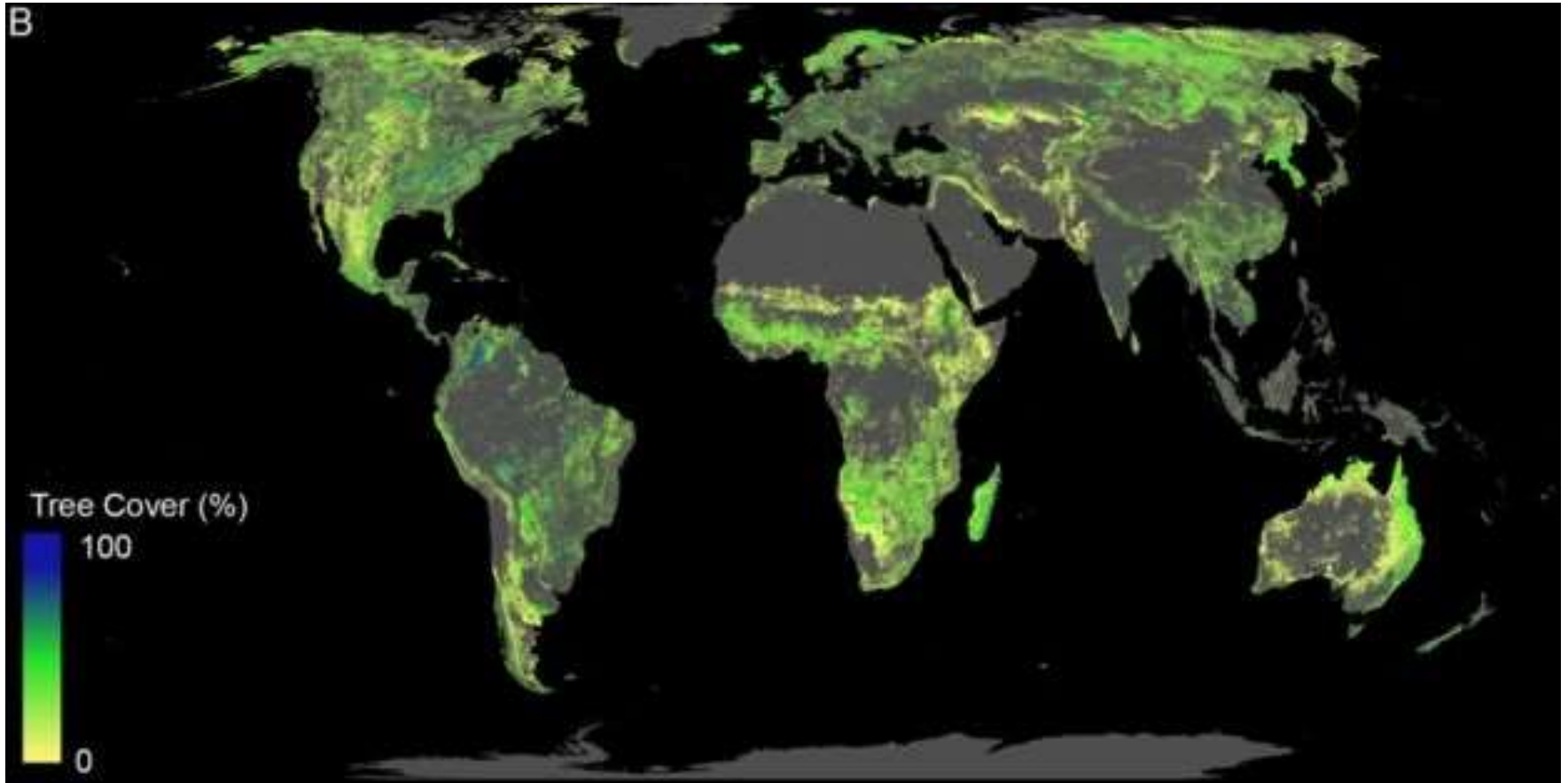
Articolo 2: «Mantere l'aumento di temperatura ben al di sotto dei 2 gradi centigradi ..

# Climate change: Trees 'most effective solution' for warming

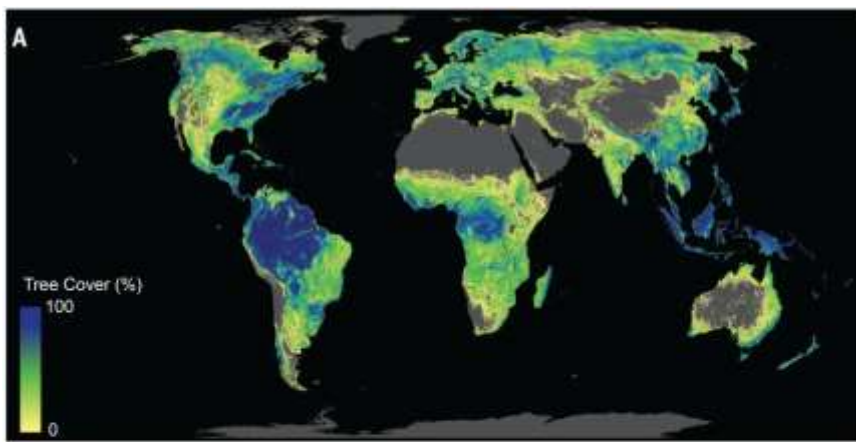
By Matt McGrath  
Environment correspondent

4 July 2019

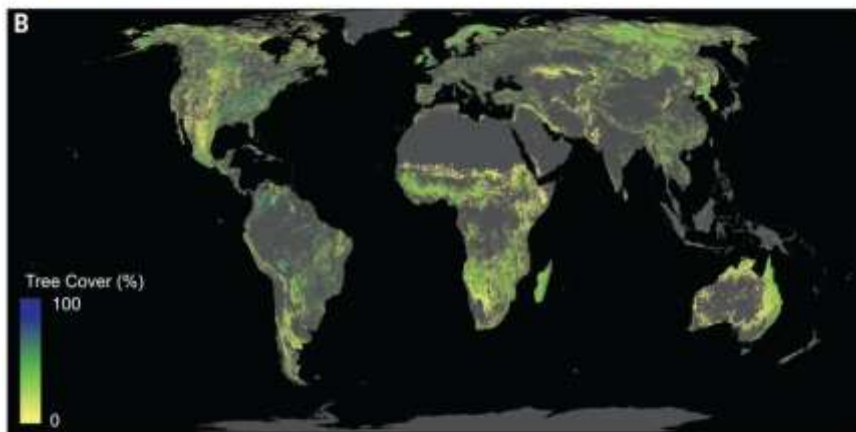
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A map showing only the potential for restoring forests and excluding desert, agricultural and urban areas.

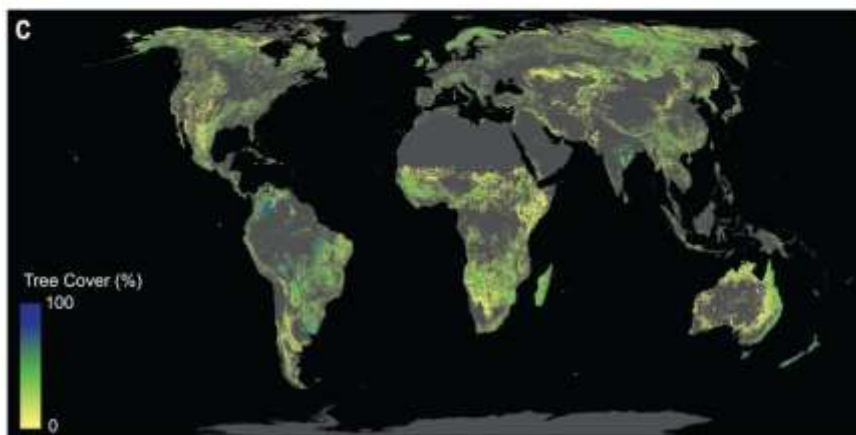


The global potential tree cover representing an area of 4.4 billion ha of canopy cover distributed across the world



**The global potential tree cover available for restoration.**

Shown is the global potential tree cover (A), from which we subtracted existing tree cover (15) and removed agricultural and urban areas according to (B) Globcover (16)



Shown is the global potential tree cover (A), from which we subtracted existing tree cover (15) and removed agricultural and urban areas according (C) Fritz *et al.* (17).

Jean-Francois Bastin et al. *Science* 2019;365:76-79

**Science**  
AAAS

**Fig. 2 The current global tree restoration potential.**



REPORT

# The global tree restoration potential

Jean-Francois Bastin<sup>1,\*</sup>, Yelena Finegold<sup>2</sup>, Claude Garcia<sup>3,4</sup>, Danilo Mollicone<sup>2</sup>, Marcelo Rezende<sup>2</sup>, Devin Routh<sup>1</sup>, Constantin...

+ See all authors and affiliations

Science 05 Jul 2019:  
Vol. 365, Issue 6448, pp. 76-79  
DOI: 10.1126/science.aax0848

***“The restoration of trees remains among the most effective strategies for climate change mitigation. We mapped the global potential tree coverage to show that 4.4 billion hectares of canopy cover could exist under the current climate. Excluding existing trees and agricultural and urban areas, we found that there is room for an extra 0.9 billion hectares of canopy cover, which could store 205 gigatonnes of carbon in areas that would naturally support woodlands and forests. This highlights global tree restoration as our most effective climate change solution to date. However, climate change will alter this potential tree coverage. We estimate that if we cannot deviate from the current trajectory, the global potential canopy cover may shrink by ~223 million hectares by 2050, with the vast majority of losses occurring in the tropics. Our results highlight the opportunity of climate change mitigation through global tree restoration but also the urgent need for action.”***

**Inspired by nature.  
Driven by science.**



# How could trees save the planet?

We could increase the world's forest cover by **0.9 billion hectares** without affecting existing cities or agriculture

**0.9**  
billion hectares

This tree cover would take up an area equivalent to the US

Restoration of forests could store **205 billion tonnes** of carbon

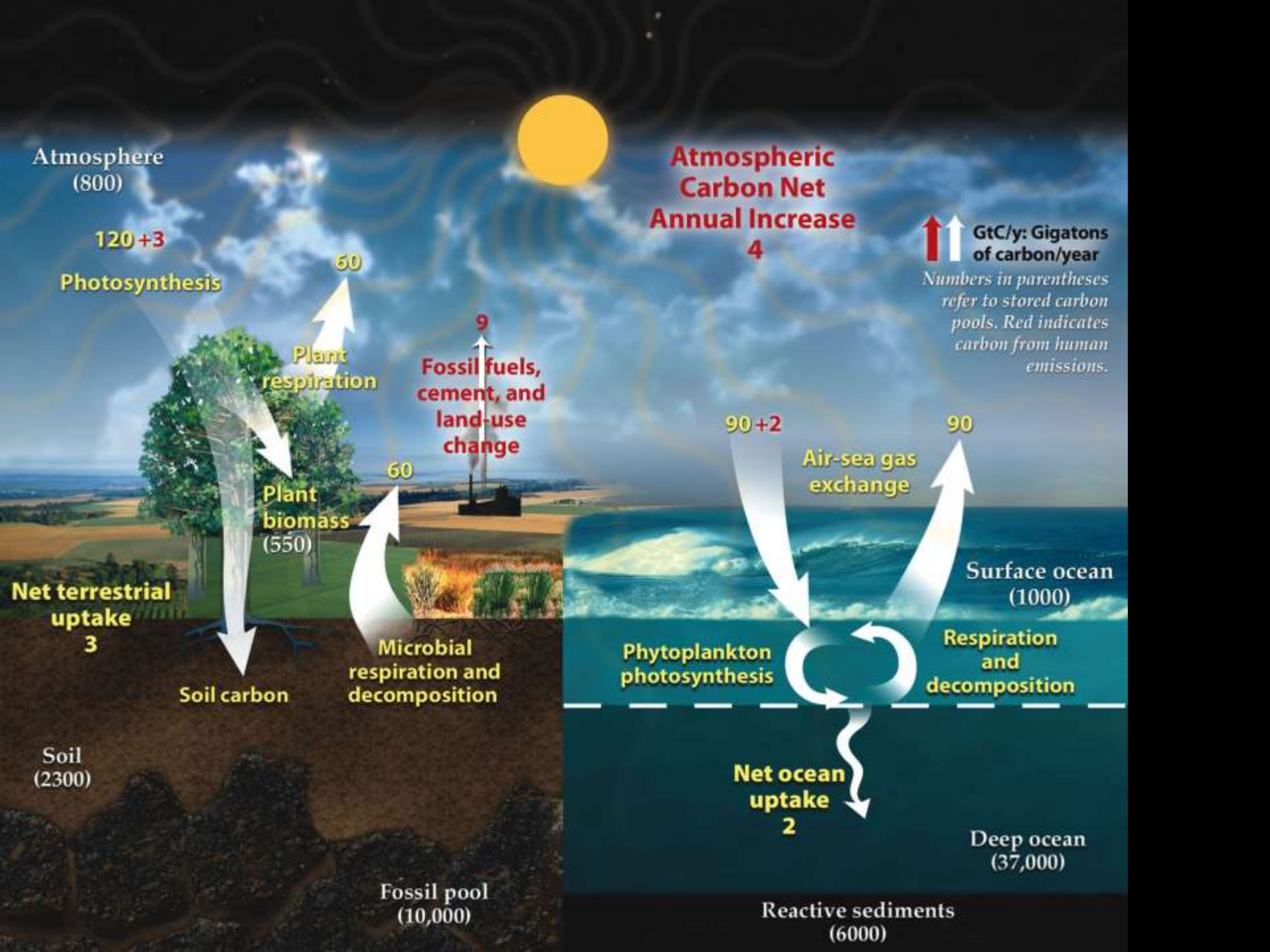
This would capture about **2/3**



of the man-made carbon emissions







Atmosphere  
(800)

**Atmospheric  
Carbon Net  
Annual Increase**  
4

↑↑ **GtC/y: Gigatons  
of carbon/year**  
*Numbers in parentheses  
refer to stored carbon  
pools. Red indicates  
carbon from human  
emissions.*

**120+3**  
**Photosynthesis**

60

**Plant  
respiration**

**9**  
**Fossil fuels,  
cement, and  
land-use  
change**

60

**Plant  
biomass  
(550)**

90+2

**Air-sea gas  
exchange**

90

**Surface ocean  
(1000)**

**Net terrestrial  
uptake**  
3

**Phytoplankton  
photosynthesis**

**Respiration  
and  
decomposition**

**Soil carbon**

**Microbial  
respiration and  
decomposition**

**Soil  
(2300)**

**Net ocean  
uptake**  
2

**Deep ocean  
(37,000)**

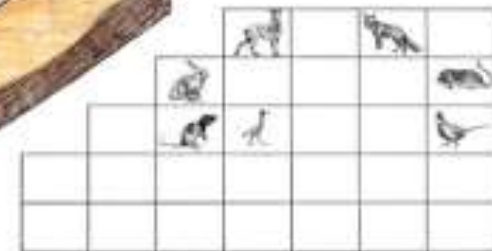
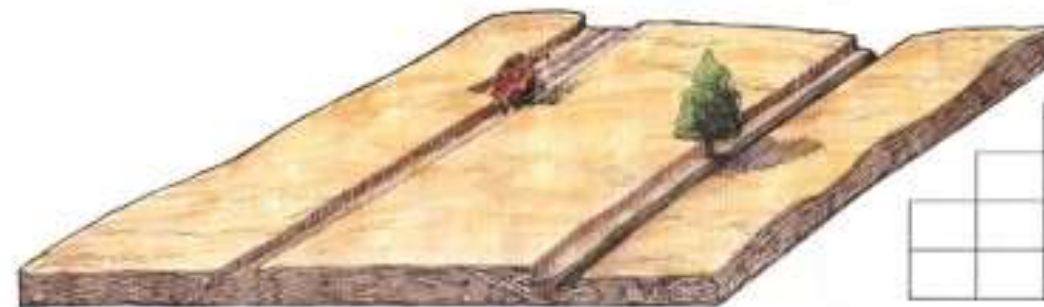
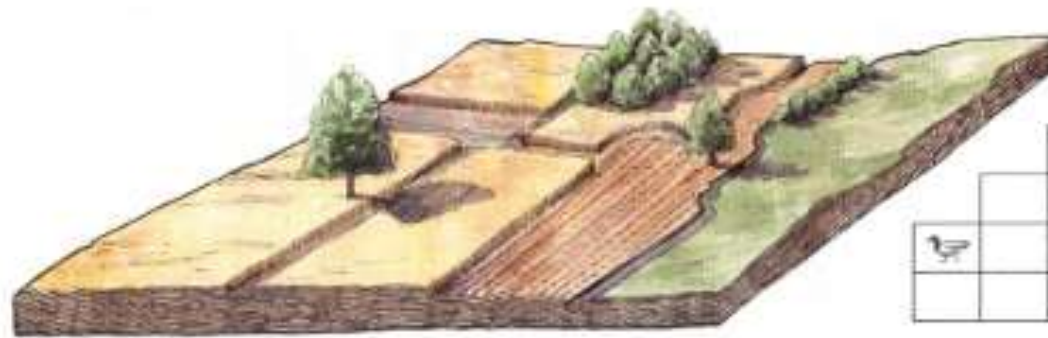
**Fossil pool  
(10,000)**

**Reactive sediments  
(6000)**

## Carbon dioxide removal (CDR)



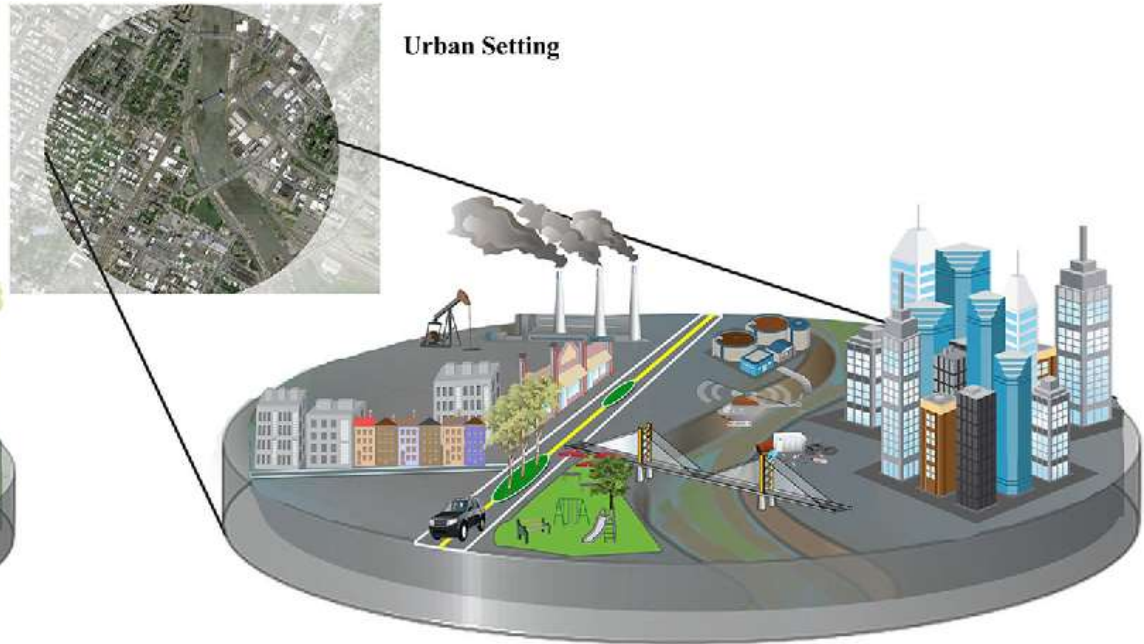
# L'EVOLUZIONE DEL PAESAGGIO AGRARIO 1910-1990



**Undeveloped Setting**



**Urban Setting**



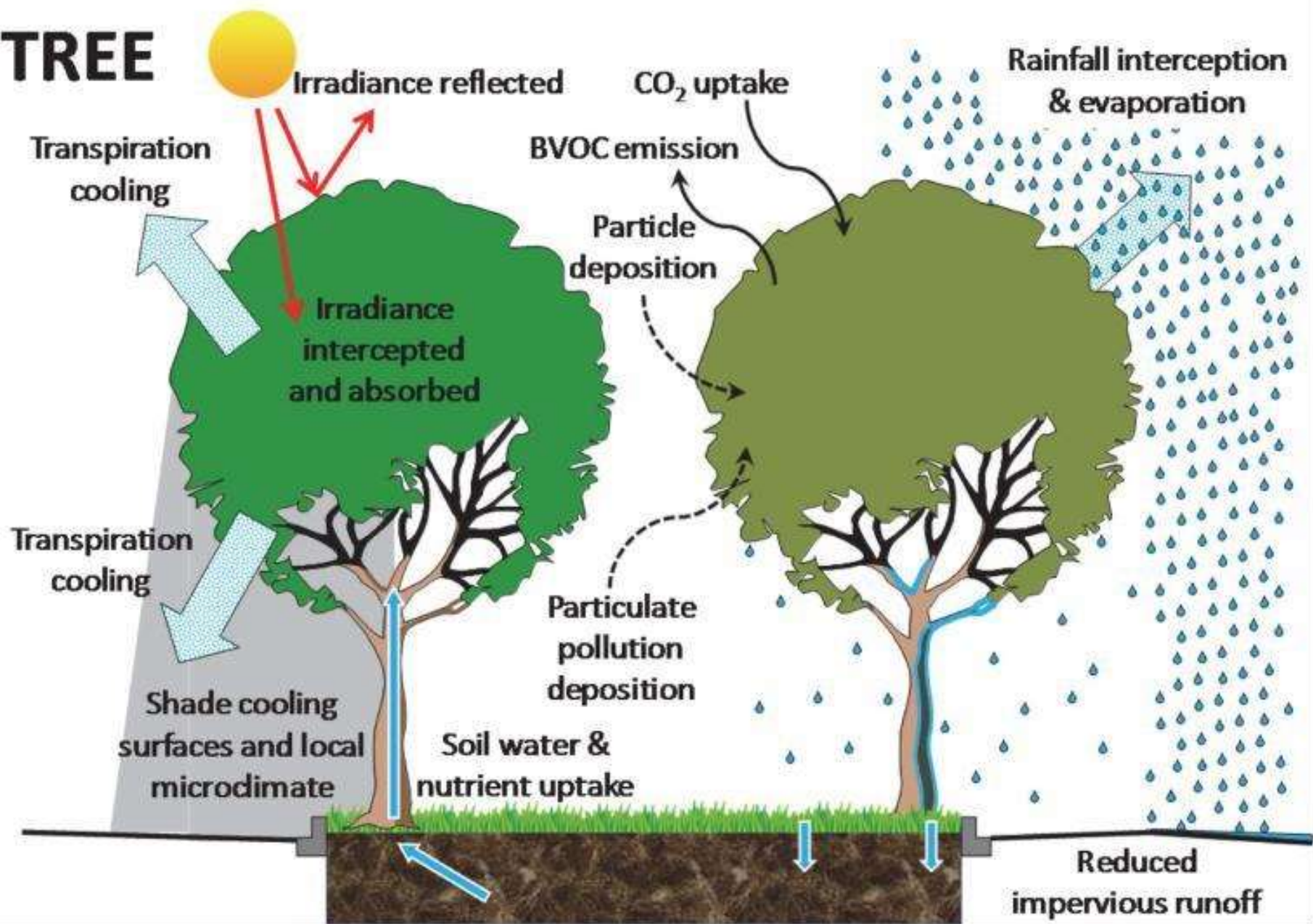
# Infrastrutture verdi: migliori condizioni di vita attraverso soluzioni in armonia con la natura

Article — Pubblicato 02/12/2015 — Ultima modifica 24/05/2018

Topics: [Biodiversità - Ecosistemi](#) [Transizione verso la sostenibilità](#) [Adattamento al cambiamento climatico](#)

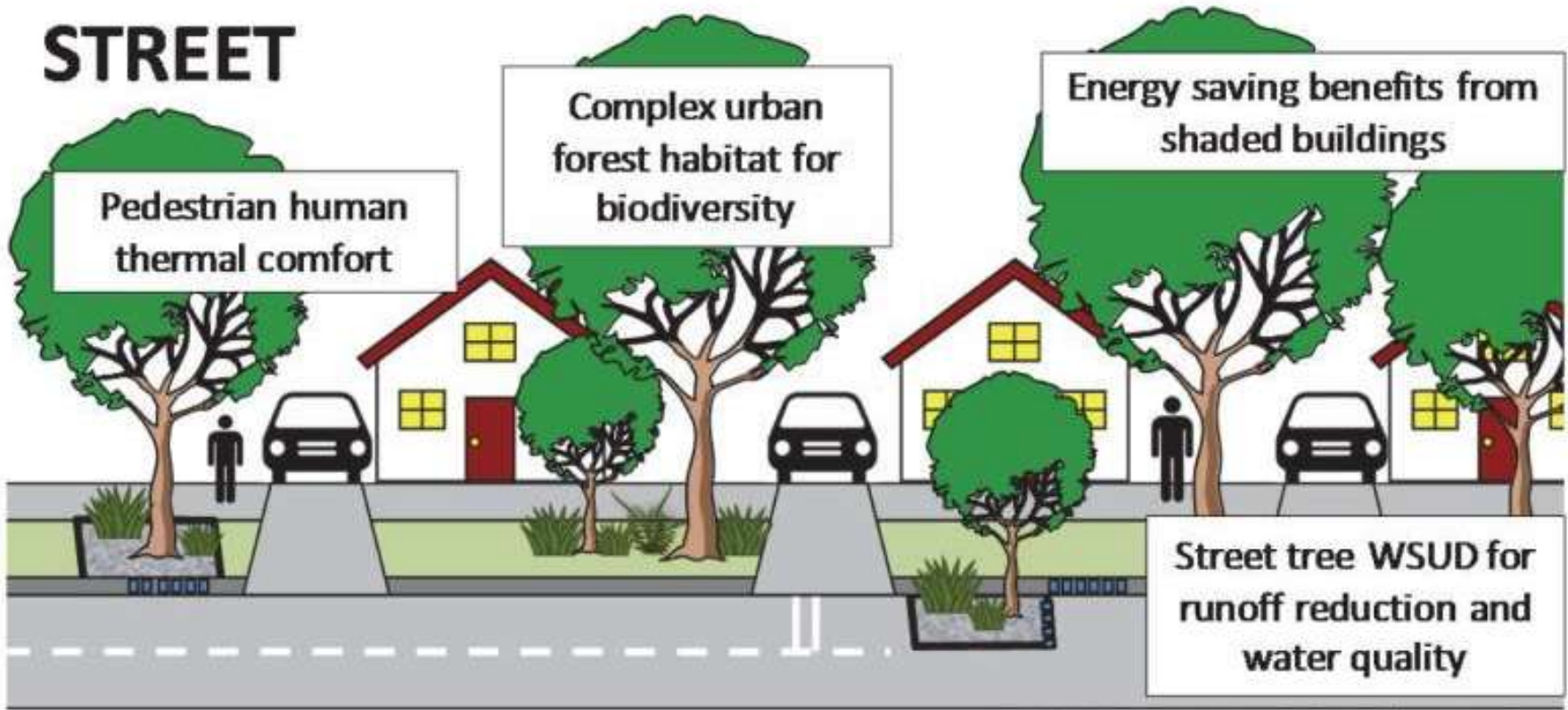


# TREE



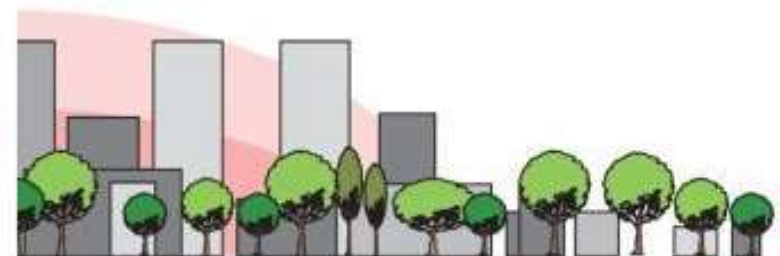
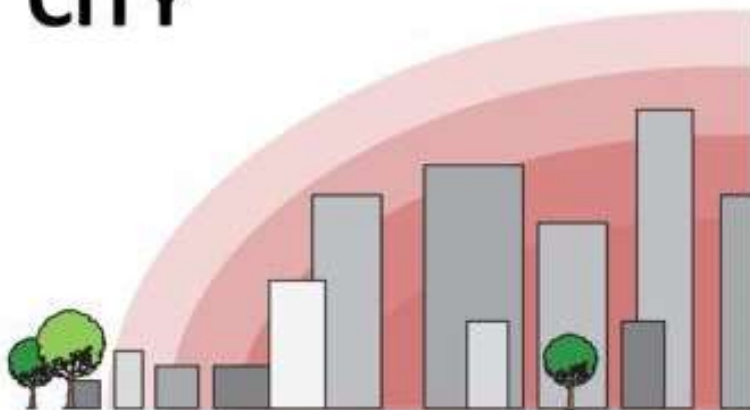
BVOC = Biological volatile organic compounds

# STREET



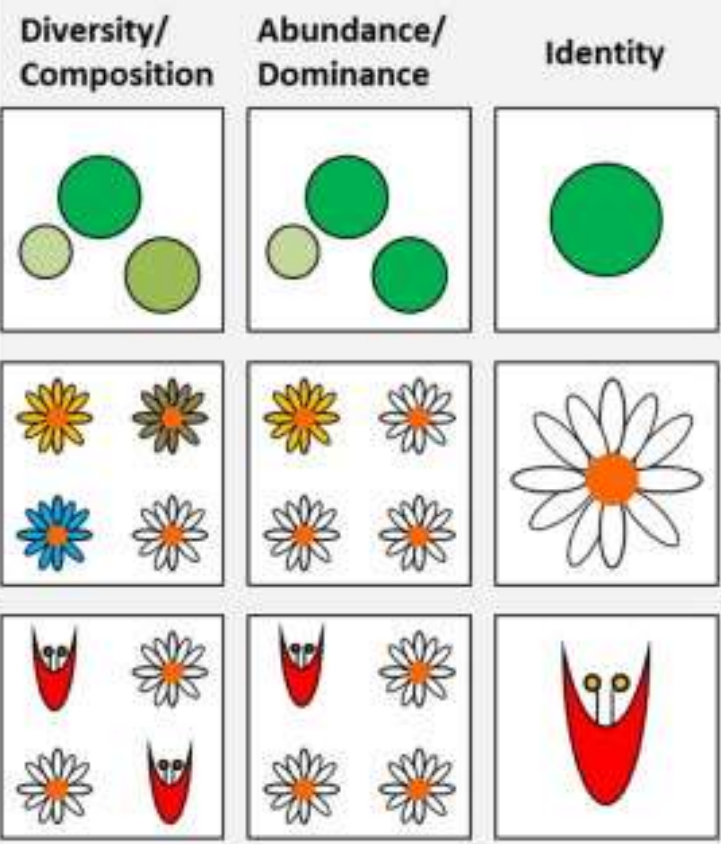
*WSUD = Water Sensitive Urban Design*

# CITY



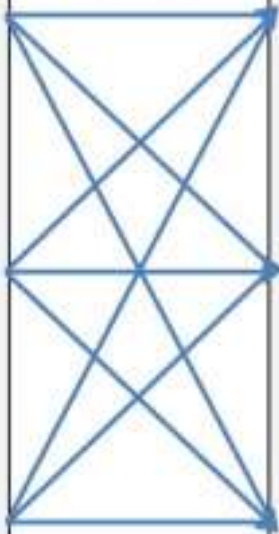
- Increased urban forest canopy can:
- reduce the urban heat island
  - reduce urban particulate pollution
  - reduce runoff and increase infiltration

# Urban Biodiversity



Habitats  
Species  
Traits

Positive?  
Negative?  
Unimodal?  
None?



# Urban Ecosystem Services

Cultural services  
Provisioning services  
Regulating services





# nature

THE INTERNATIONAL WEEKLY JOURNAL OF SCIENCE

## THE HUMAN EPOCH

Defining the Anthropocene PAGES 144 & 171

CONFLICT RESOLUTION

### BUILDING BRIDGES

Long-standing disputes can be fixed — in theory

PAGE 140

LINGUISTICS

### SCIENTIFICALLY SPEAKING

How English became the academic lingua franca

PAGE 154

RISK MANAGEMENT

### TAKING IT PERSONALLY

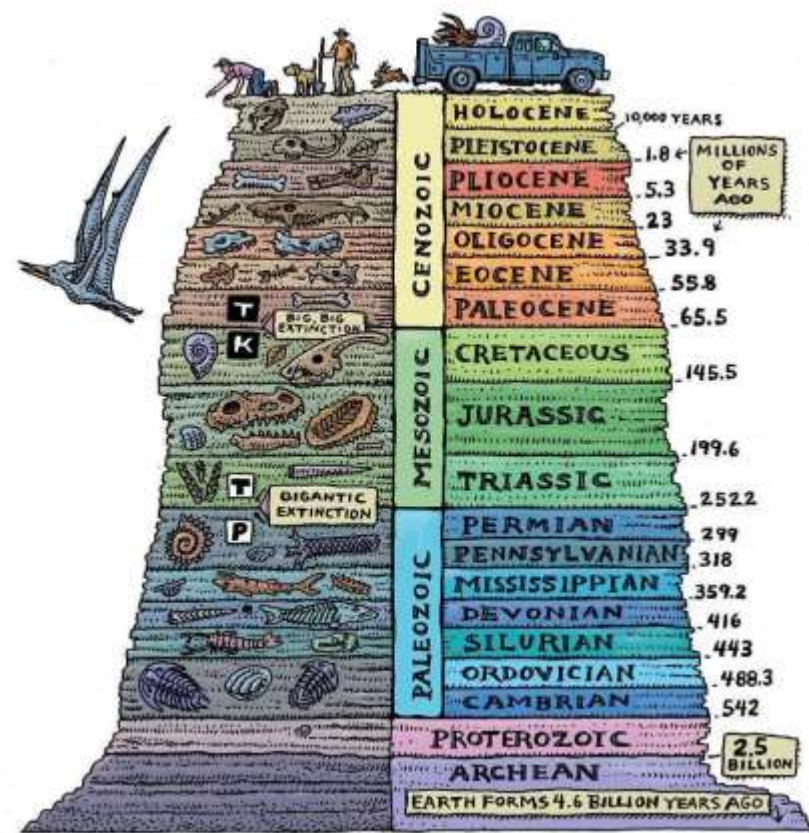
Model the growing interconnectivity of risk

PAGE 151

NATURE.COM/NATURE

12 March 2015 £10

Vol. 519, No. 7542



Stratotipo con

- MICROPLASTICHE
- METALLI PESANTI
- RADIONUCLIDI

STRATI CON

- TECNOFOSSILI
- RESIDUI DI ANIMALI DOMESTICI
- TRACCE DI CLORO

# PIRAMIDE AMBIENTALE

BASSO

ALTO



ALTO

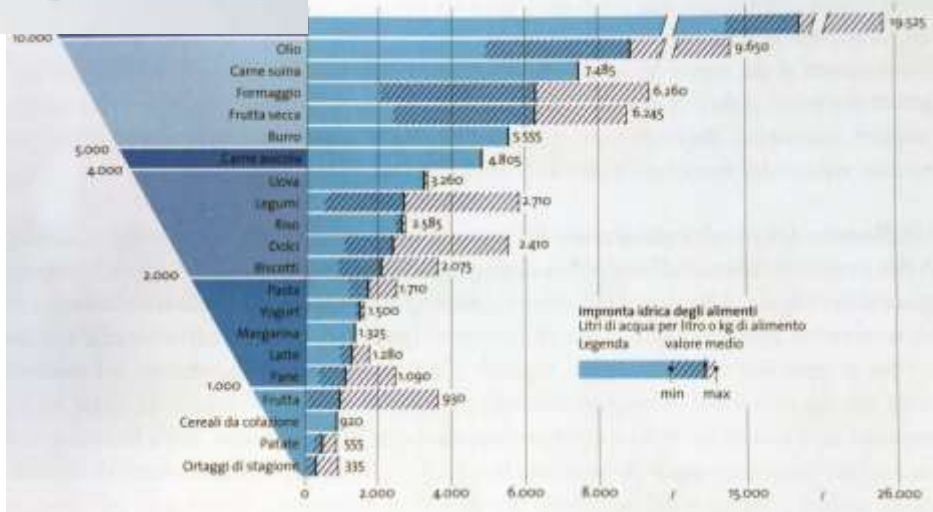
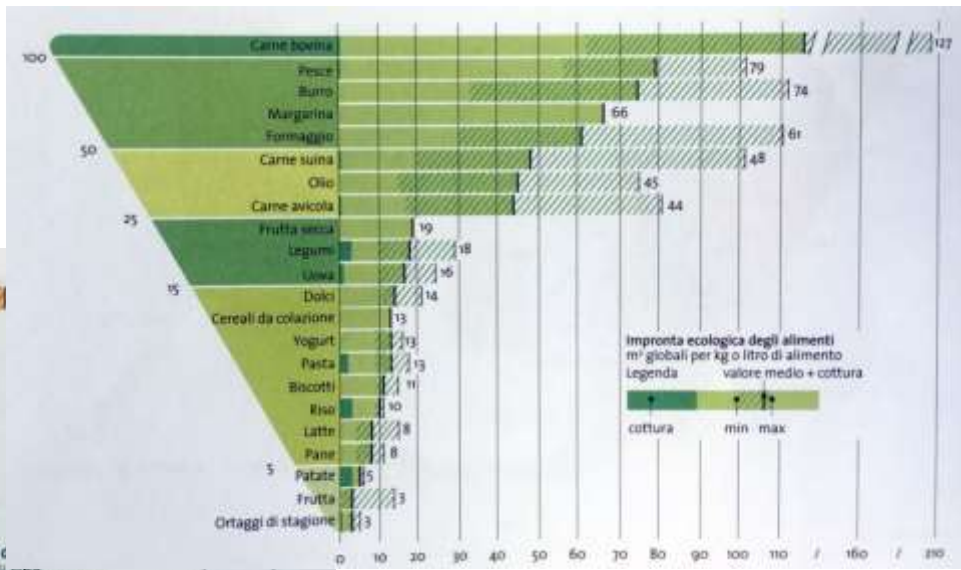
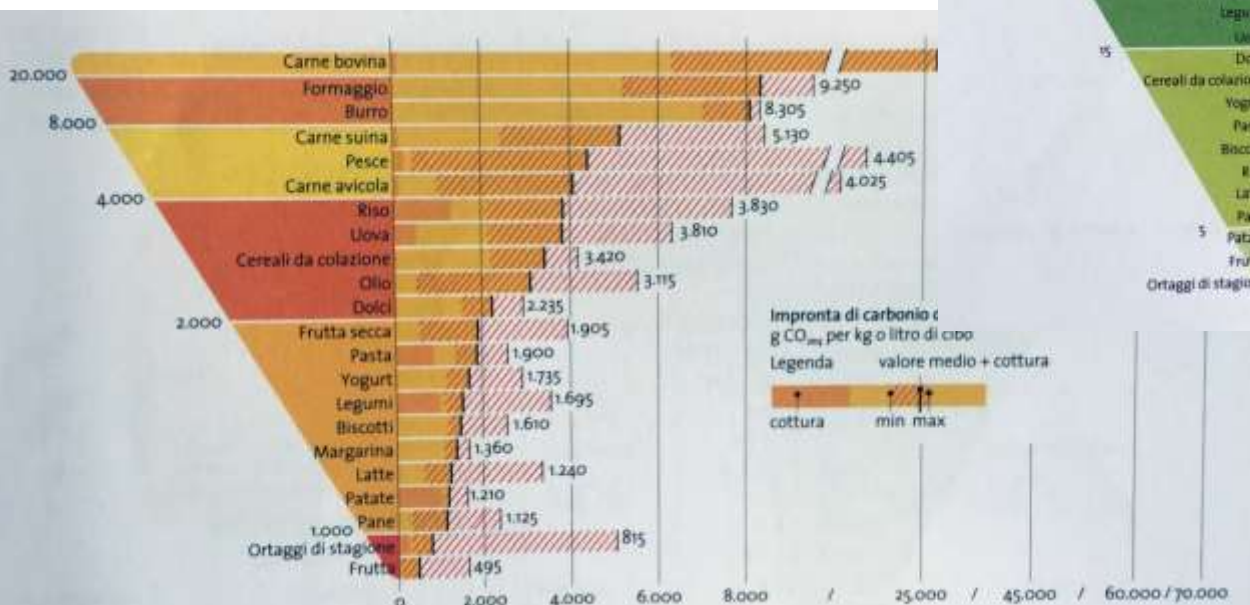
BASSO

# PIRAMIDE ALIMENTARE

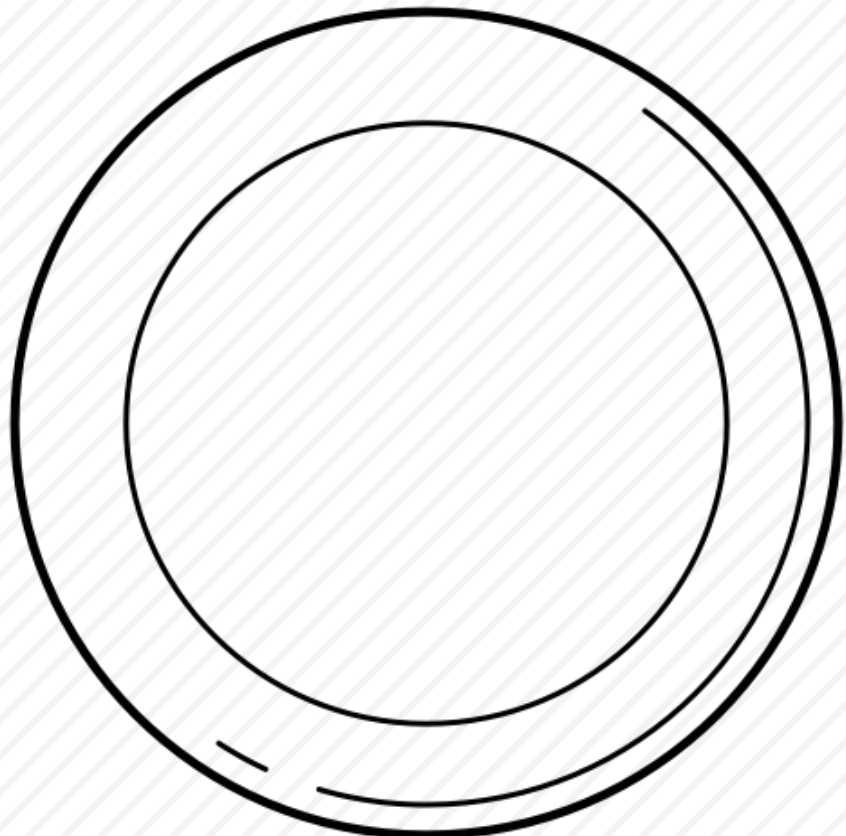
- Top Layer (Red):** Carne bovina
- Second Layer (Orange):** Pesce, Formaggio
- Third Layer (Yellow):** Carne suina, Olio, Carne avicola
- Fourth Layer (Light Green):** Frutta secca, Legumi, Uova
- Bottom Layer (Green):** Dolci, Yogurt, Pasta, Biscotti, Riso, Latte, Pane, Patate, Frutta, Ortaggi

Fonte





# Componi il tuo piatto



- Pane* g.....
- Formaggio* g.....
- Salumi* g.....
- Legumi* g.....
- Verdura* g.....
- Frutta* g.....
- Dolci da forno* g.....

Nome \_\_\_\_\_

Provenienza \_\_\_\_\_

Professione \_\_\_\_\_

Data: \_\_\_/\_\_\_/\_\_\_

Sesso: M / F

Età \_\_\_



2.711 litri



3,2 m<sup>2</sup>



665 g



333 litri



1,7 m<sup>2</sup>



591 g

*Adesso calcola  
le tue impronte*

*(valori riferiti ad 1 kg)*



6.261 litri



60,7 m<sup>2</sup>



9.252 g



1.094 litri



6 m<sup>2</sup>



1.011 g



500 litri



3 m<sup>2</sup>



720 g



7.485 litri



47 m<sup>2</sup>



5.016 g



2.411 litri



14,1 m<sup>2</sup>



2.237 g



600 litri



2 m<sup>2</sup>



300 g

*«Questa mattina mi sono svegliata, sono saltata giù dal letto e ho spalancato la finestra per salutare gli alberi di fronte. E ho ripensato a come ho trovato questo appartamento, in una mattina in cui avevo a malapena le ore sufficienti a vederlo e a decidere.*

*Non pensavo sarebbe stato così facile: siccome c'erano quegli alberi di fronte ad ogni finestra, dissi che avrei sicuramente preso in affitto la casa. In questi anni li ho guardati alzando gli occhi dalle pagine di un libro, durante un pomeriggio di pioggia o di neve o nel caldo dell'estate. Li ho salutati nelle prime ore del giorno o di notte, prima di coricarmi. Sono stata grata per le loro chiome folte e li ho ammirati nei mesi in cui si spogliano delle cose che attirano di più la nostra attenzione.*

*Avere vicino a noi degli alberi ci fa vivere più a lungo, ammalarci di meno, studiare meglio, abbassare i livelli di tensione, come ho letto, qualche giorno fa, in un articolo bellissimo. Uno di quegli articoli che ti fanno pensare che puoi fare qualcosa, e subito: mettere una nuova pianta in ufficio o in un'aula scolastica o sul balcone di casa o nel soggiorno, per esempio. E mi sono detta che è quello che farò.*

*Ci penso da anni: **fare spazio a una grande pianta che evochi, se non proprio un bosco, un avamposto di un luogo che gli assomigli.** Regalerò una poltrona e porterò un pezzetto di verde in più nella mia casa. Verde come una sentinella nella vita. Verde. L'unico colore, se non mi sbaglio, che si è meritato l'eternità. Quando diciamo "sempreverde", infatti, glielo riconosciamo e gli rendiamo omaggio. Il che, se ci pensate, non è poco.»*

Sabato #9novembre 2019, il #Risveglio di Natascha Lusenti a #Ovunque6, in onda ogni sabato e domenica dalle 6 alle 7:30 del mattino, con Federico Bernocchi.

RADIO2