Agricoltura biologica, la riposta globale al riscaldamento globale

SANA

Bologna, 12 settembre 2016

Agricoltura biologica, una risposta concreta ai cambiamenti climatici (e ad altre grandi sfide ambientali globali)

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Daily CO2

Daily CO_2

Mauna Loa Observatory | Atmospheric CO_2 Concentrations

September 9, 2016	**401.31 ppm**	*NOAA-ESRL*
September 9, 2015	**397.79 ppm**	*NOAA-ESRL*

daily mean concentrations | ppm = parts per million

Highest-ever daily average CO2 at MLO: 409.44 ppm on April 9, 2016 (Scripps)
2nd highest daily average CO2 at MLO: 409.39 ppm on April 8, 2016 (Scripps)

Highest daily peak CO2 recorded at MLO for 2015: 404.84 ppm on April 13, 2015 (Scripps)

When available, daily average values for carbon dioxide in the atmosphere are posted here as a year-over-year comparison. Measurements are made by two independent CO_2 monitoring programs (NOAA and Scripps) at the Mauna Loa Observatory in Hawaii, about 3400 metres above sea level.

CO2 Earth presents a year-over-year comparison of recent daily readings for public education purposes. Tracking these readings can provide opportunities for in the moment

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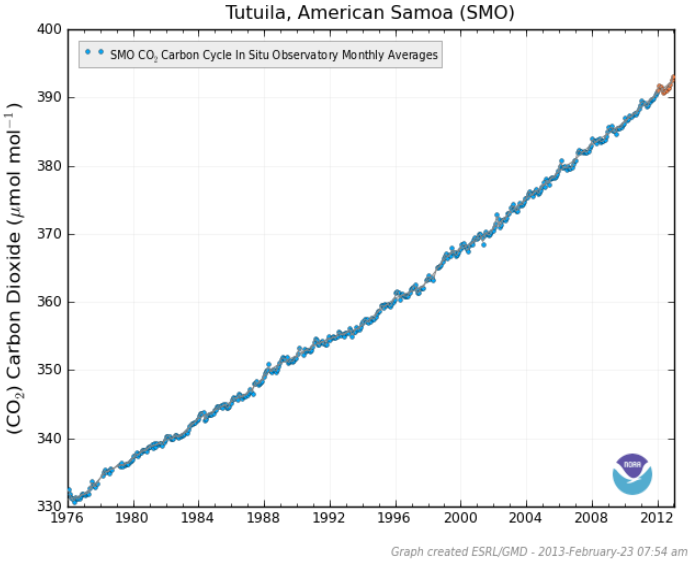
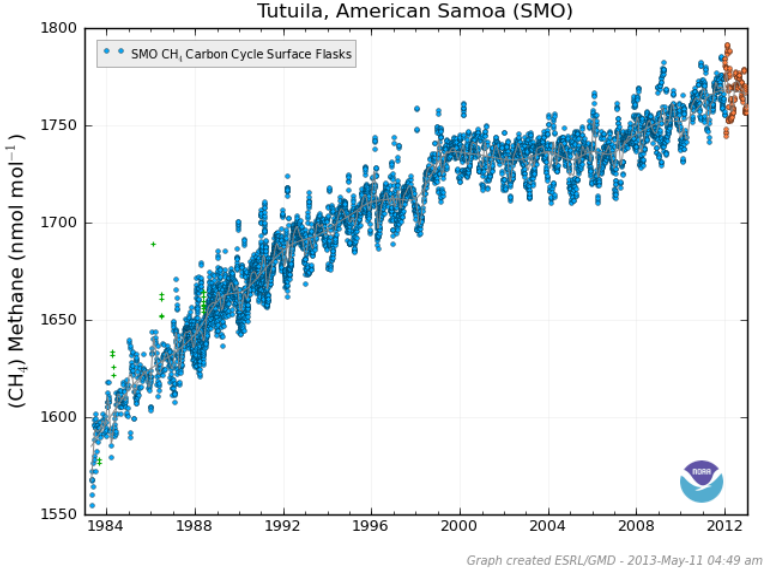
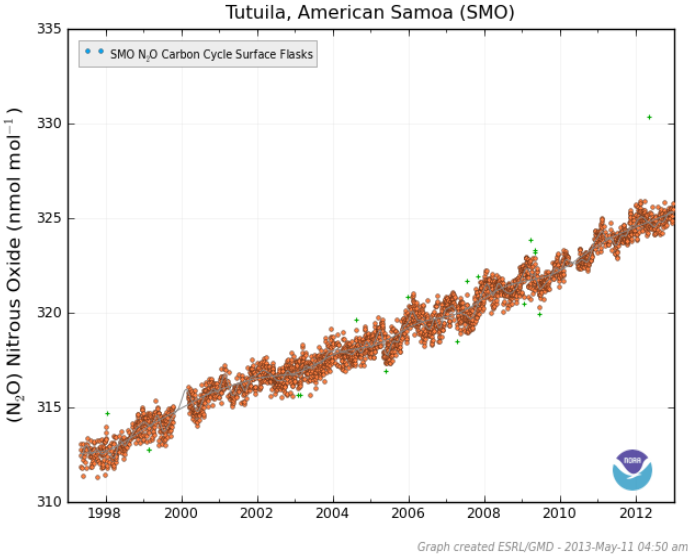
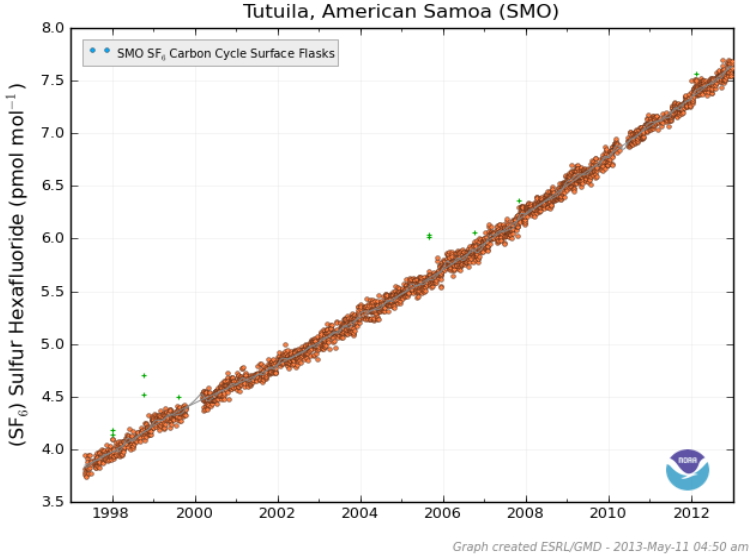

Tutuila, American Samoa (SMO)
SMO CO_2 Carbon Cycle In Situ Observatory Monthly Averages
(CO_2) Carbon Dioxide (μmol mol^{-1})
400
390
380
370
360
350
340
330
1976
1980
1984
1988
1992
1996
2000
2004
2008
2012
Graph created ESRL/GMD - 2013-February-23 07:54 am


Tutuila, American Samoa (SMO)
SMO CH_4 Carbon Cycle Surface Flasks
(CH_4) Methane (nmol mol^{-1})
1800
1750
1700
1650
1600
1550
1984
1988
1992
1996
2000
2004
2008
2012
Graph created ESRL/GMD - 2013-May-11 04:49 am


Tutuila, American Samoa (SMO)
SMO N_2O Carbon Cycle Surface Flasks
(N_2O) Nitrous Oxide (nmol mol^{-1})
335
330
325
320
315
310
1998
2000
2002
2004
2006
2008
2010
2012
Graph created ESRL/GMD - 2013-May-11 04:50 am


Tutuila, American Samoa (SMO)
SMO SF_6 Carbon Cycle Surface Flasks
(SF_6) Sulfur Hexafluoride (pmol mol^{-1})
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
1998
2000
2002
2004
2006
2008
2010
2012
Graph created ESRL/GMD - 2013-May-11 04:50 am

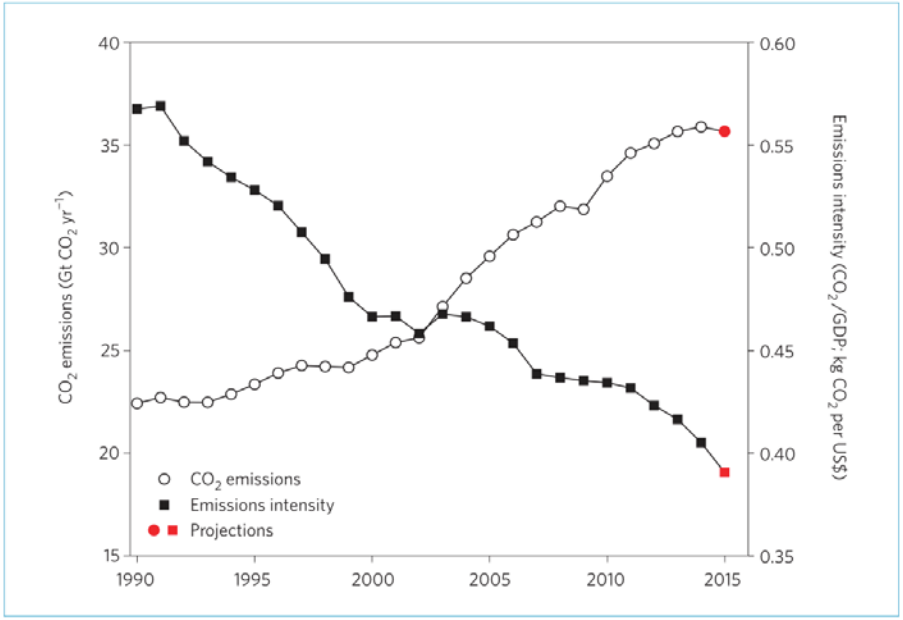
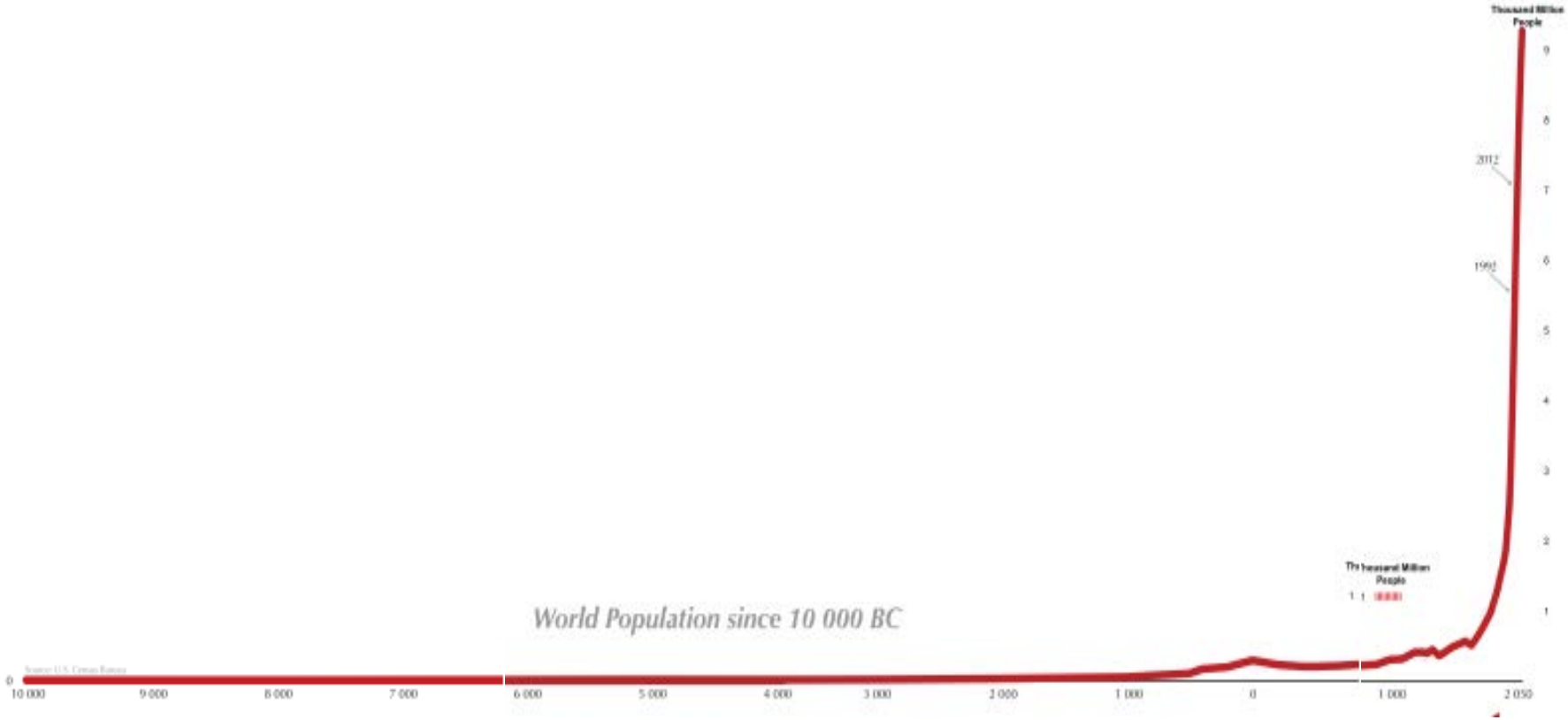


Figure 1 | Global CO_2 emissions from fossil-fuel use and industry since 1990 and emissions intensity CO_2/GDP. The red symbols are projections for 2015.

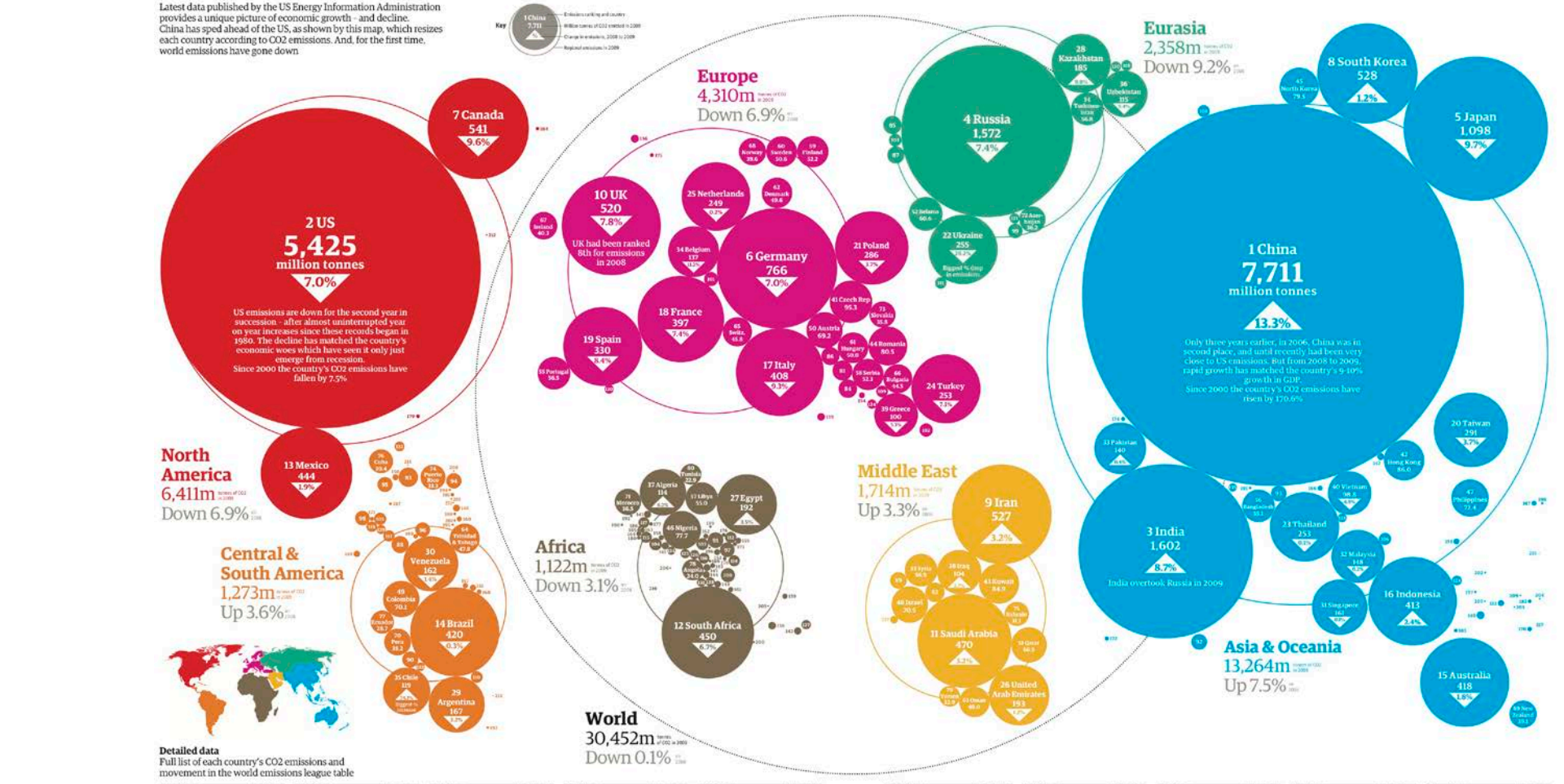
35 miliardi di tonnellate equivalenti di CO2 sono stati riversate in atmosfera nel corso del 2014, il valore più alto da sempre. Nel 2015 si è verificato un arresto di questa crescita, per via della crisi economica globale e della riduzione dell'uso del carbone da parte della Cina. L'uso del carbone rappresenta oggi circa un terzo delle emissioni globali di co2 da fonti fossili.

EVOLUZIONE DELLA POPOLAZIONE DAL 10.000 A.C. A OGGI



An atlas of pollution: the world in carbon dioxide emissions

Latest data published by the US Energy Information Administration provides a unique picture of economic growth – and decline. China has sped ahead of the US, as shown by this map, which resizes each country according to CO2 emissions. And, for the first time, world emissions have gone down

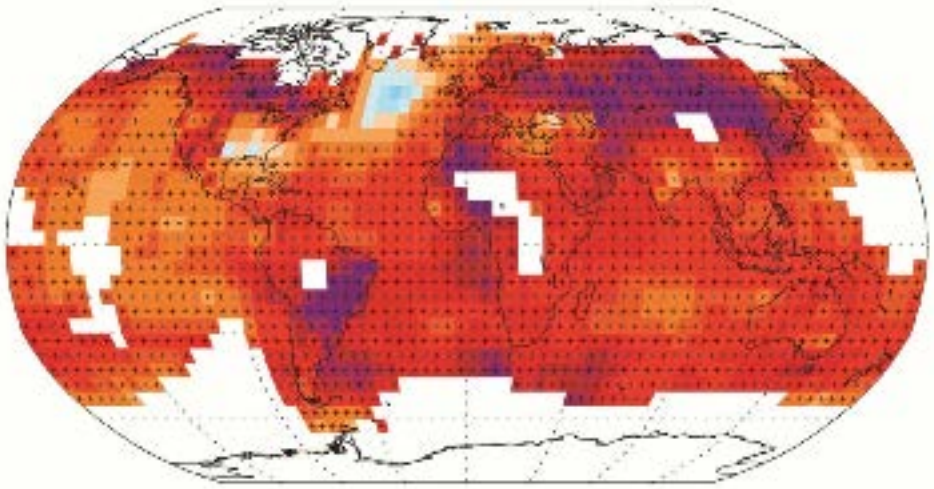


Detailed data
Full list of each country's CO2 emissions and movement in the world emissions league table

	1990	1995	2000	2005	2010	2014	Share in EU-28*
EU-28	**5 735.1**	**5 399.3**	**5 283.8**	**5 347.0**	**4 914.4**	**4 419.2**	**100.00%**
Belgium	149.2	156.9	153.9	148.4	137.5	117.9	2.67%
Bulgaria	104.8	74.4	58.5	63.2	60.3	55.4	1.25%
Czech Republic	199.8	158.7	151.5	149.7	141.1	126.8	2.87%
Denmark	72.4	80.4	73.4	69.3	66.0	53.9	1.22%
Germany	1 258.2	1 133.4	1 060.3	1 012.8	963.6	969.1	21.93%
Estonia	40.1	20.0	17.1	18.4	20.0	21.2	0.48%
Ireland	57.2	61.0	71.2	72.9	64.6	60.6	1.37%
Greece	107.3	113.4	130.2	138.4	120.8	104.3	2.36%
Spain	291.6	333.0	395.3	450.5	373.6	342.7	7.75%
France	556.8	557.7	568.8	570.6	530.7	475.4	10.76%
Croatia	35.2	24.6	27.1	31.3	29.2	24.8	0.56%
Italy	526.1	539.2	562.6	588.1	517.9	428.0	9.69%
Cyprus	6.4	7.9	9.2	10.2	10.4	9.2	0.21%
Latvia	26.4	12.9	10.5	11.6	12.6	11.6	0.26%
Lithuania	47.5	21.7	18.8	22.4	20.2	19.2	0.44%
Luxembourg	13.3	10.7	10.7	14.4	13.5	12.0	0.27%
Hungary	94.6	76.2	74.2	76.7	66.2	57.7	1.31%
Malta	2.2	2.8	3.0	3.2	3.4	3.3	0.08%
Netherlands	226.8	239.8	230.2	225.5	224.1	198.0	4.48%
Austria	79.7	81.2	82.1	94.8	87.0	78.3	1.77%
Poland	473.5	446.0	393.0	397.9	407.7	382.0	8.64%
Portugal	62.1	73.0	86.0	90.5	73.1	67.6	1.53%
Romania	252.7	183.4	140.9	147.0	117.5	110.4	2.50%
Slovenia	18.7	18.8	19.2	20.6	19.7	16.7	0.38%
Slovakia	74.8	54.8	50.0	51.6	46.7	40.8	0.92%
Finland	72.4	72.8	71.1	70.9	77.6	61.1	1.38%
Sweden	73.3	75.5	70.8	68.9	67.1	56.7	1.28%
United Kingdom	812.2	769.0	744.0	727.3	642.1	556.7	12.60%

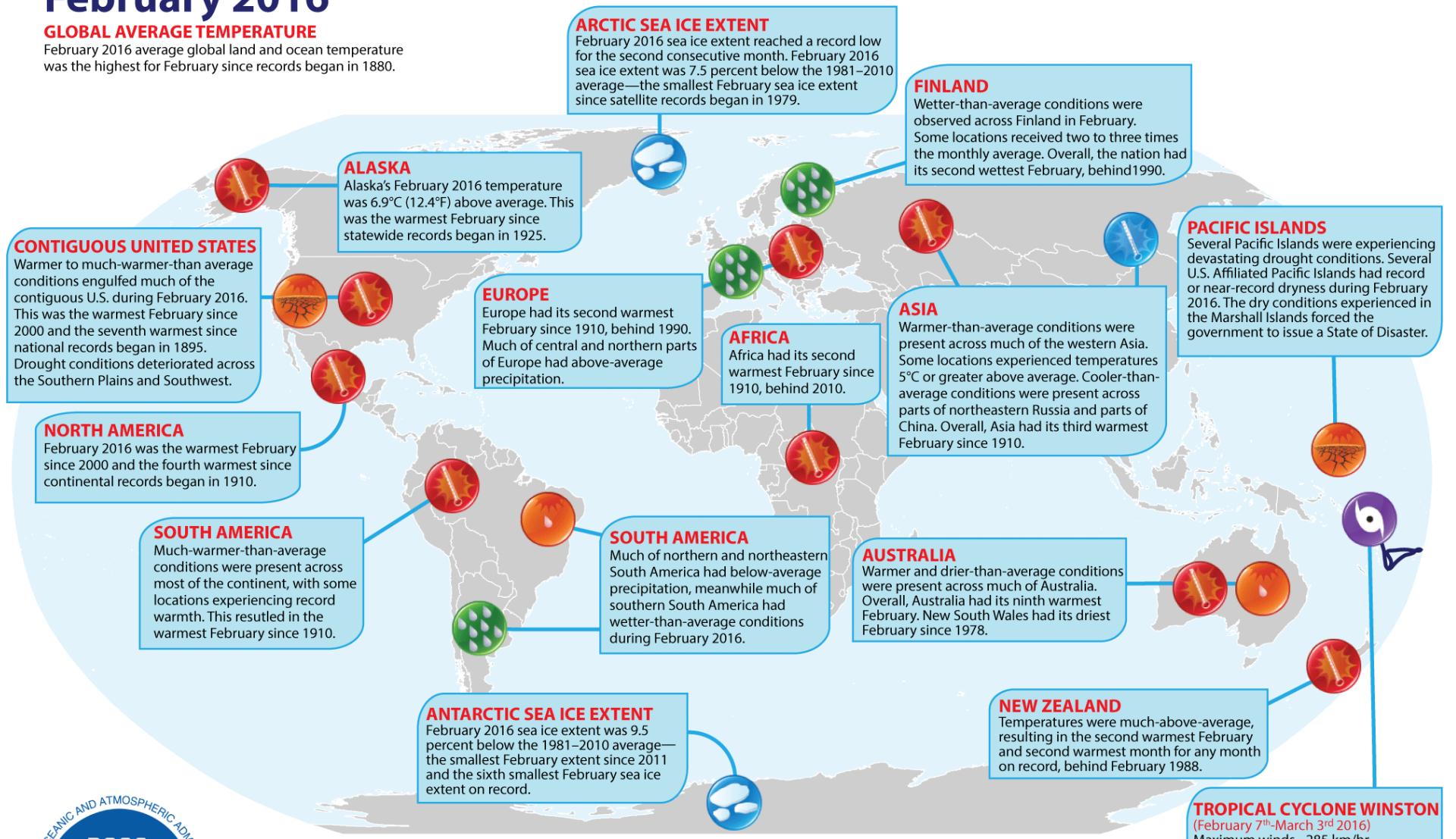
*Share in EU-28 total in year 2014

(b) Observed change in average surface temperature 1901–2012



ISPRA
Istituto Superiore per la Protezione
e la Ricerca Ambientale

Selected Significant Climate Anomalies and Events
February 2016



GLOBAL AVERAGE TEMPERATURE
February 2016 average global land and ocean temperature was the highest for February since records began in 1880.

ARCTIC SEA ICE EXTENT
February 2016 sea ice extent reached a record low for the second consecutive month. February 2016 sea ice extent was 7.5 percent below the 1981–2010 average—the smallest February sea ice extent since satellite records began in 1979.

FINLAND
Wetter-than-average conditions were observed across Finland in February. Some locations received two to three times the monthly average. Overall, the nation had its second wettest February, behind1990.

ALASKA
Alaska's February 2016 temperature was 6.9°C (12.4°F) above average. This was the warmest February since statewide records began in 1925.

CONTIGUOUS UNITED STATES
Warmer to much-warmer-than average conditions engulfed much of the contiguous U.S. during February 2016. This was the warmest February since 2000 and the seventh warmest since national records began in 1895. Drought conditions deteriorated across the Southern Plains and Southwest.

EUROPE
Europe had its second warmest February since 1910, behind 1990. Much of central and northern parts of Europe had above-average precipitation.

AFRICA
Africa had its second warmest February since 1910, behind 2010.

ASIA
Warmer-than-average conditions were present across much of the western Asia. Some locations experienced temperatures 5°C or greater above average. Cooler-than-average conditions were present across parts of northeastern Russia and parts of China. Overall, Asia had its third warmest February since 1910.

PACIFIC ISLANDS
Several Pacific Islands were experiencing devastating drought conditions. Several U.S. Affiliated Pacific Islands had record or near-record dryness during February 2016. The dry conditions experienced in the Marshall Islands forced the government to issue a State of Disaster.

NORTH AMERICA
February 2016 was the warmest February since 2000 and the fourth warmest since continental records began in 1910.

SOUTH AMERICA
Much-warmer-than-average conditions were present across most of the continent, with some locations experiencing record warmth. This resutled in the warmest February since 1910.

SOUTH AMERICA
Much of northern and northeastern South America had below-average precipitation, meanwhile much of southern South America had wetter-than-average conditions during February 2016.

AUSTRALIA
Warmer and drier-than-average conditions were present across much of Australia. Overall, Australia had its ninth warmest February. New South Wales had its driest February since 1978.

ANTARCTIC SEA ICE EXTENT
February 2016 sea ice extent was 9.5 percent below the 1981–2010 average—the smallest February extent since 2011 and the sixth smallest February sea ice extent on record.

NEW ZEALAND
Temperatures were much-above-average, resulting in the second warmest February and second warmest month for any month on record, behind February 1988.

TROPICAL CYCLONE WINSTON
(February 7th-March 3rd 2016)
Maximum winds - 285 km/hr
Winston was one of the strongest cyclones to make landfall on Fiji on record. Winston caused significant damage as it hit the island as a Category 5 storm.

Please Note: Material provided in this map was compiled from NOAA's State of the Climate Reports. For more information please visit: http://www.ncdc.noaa.gov/sotc

NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

Gli impatti già osservati dei cambiamenti climatici riguardano:

•gli ecosistemi: distribuzione, composizione, struttura, funzione, fenologia, servizi ecosistemici

•le specie: variazioni della distribuzione (migrazione verso nord e quote più elevate, contrazione del *range*), fenologia e crescita, della popolazione (temp., precipit., eventi estremi, competiz., patog. e parass., disponibilità di cibo, fecondità e riproduzione), estinzione

•la diversità genetica

Best wines will come from Scotland if climate change is not stopped, French chefs say

Prominent French chefs have given warning that the country's wines will lose their complexity and the best produce will come from Scotland if the effects of climate change are not tackled.

By Henry Samuel in Paris
Published: 7:00AM BST 17 Aug 2009

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6 bottles - £71.50 - Save
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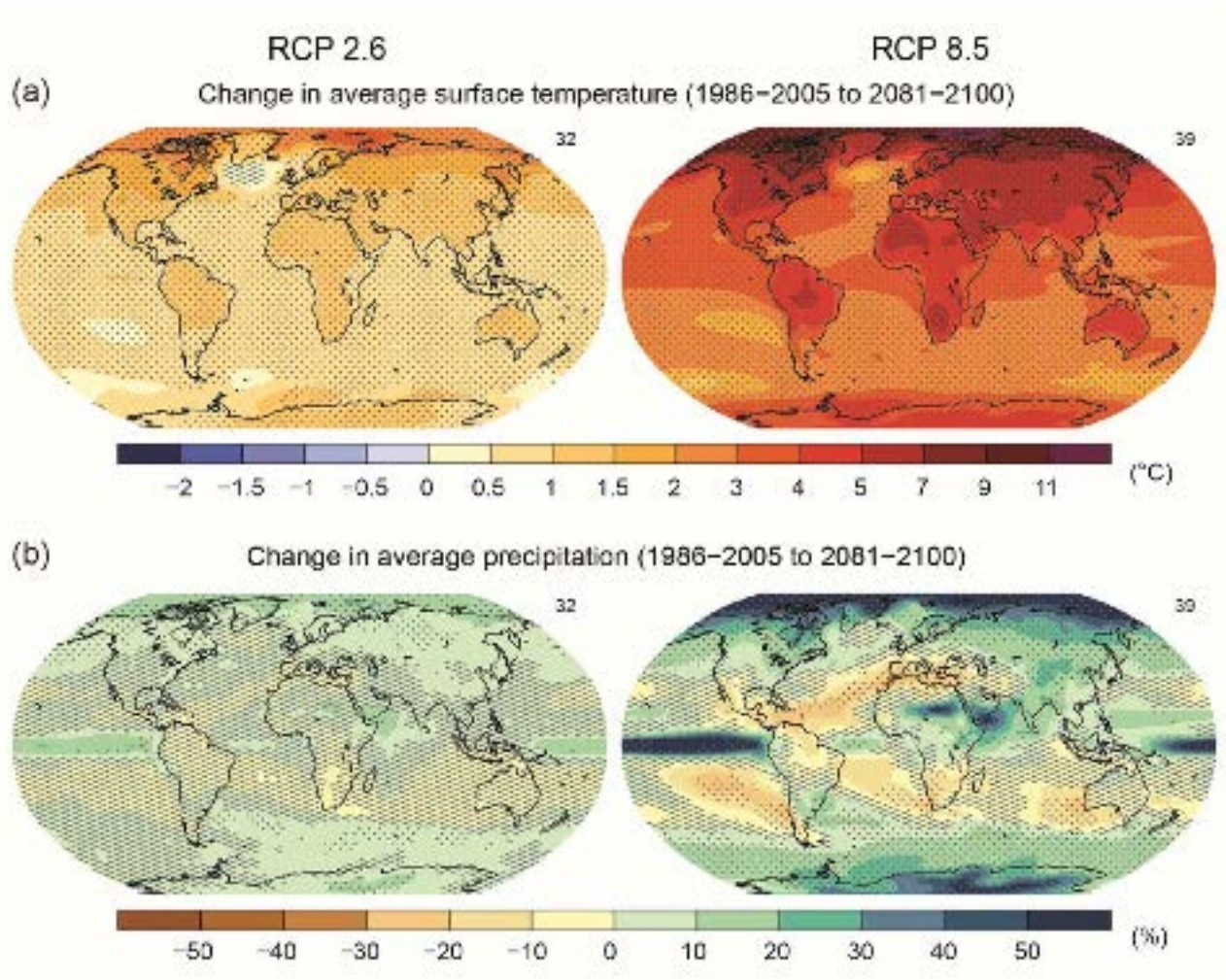
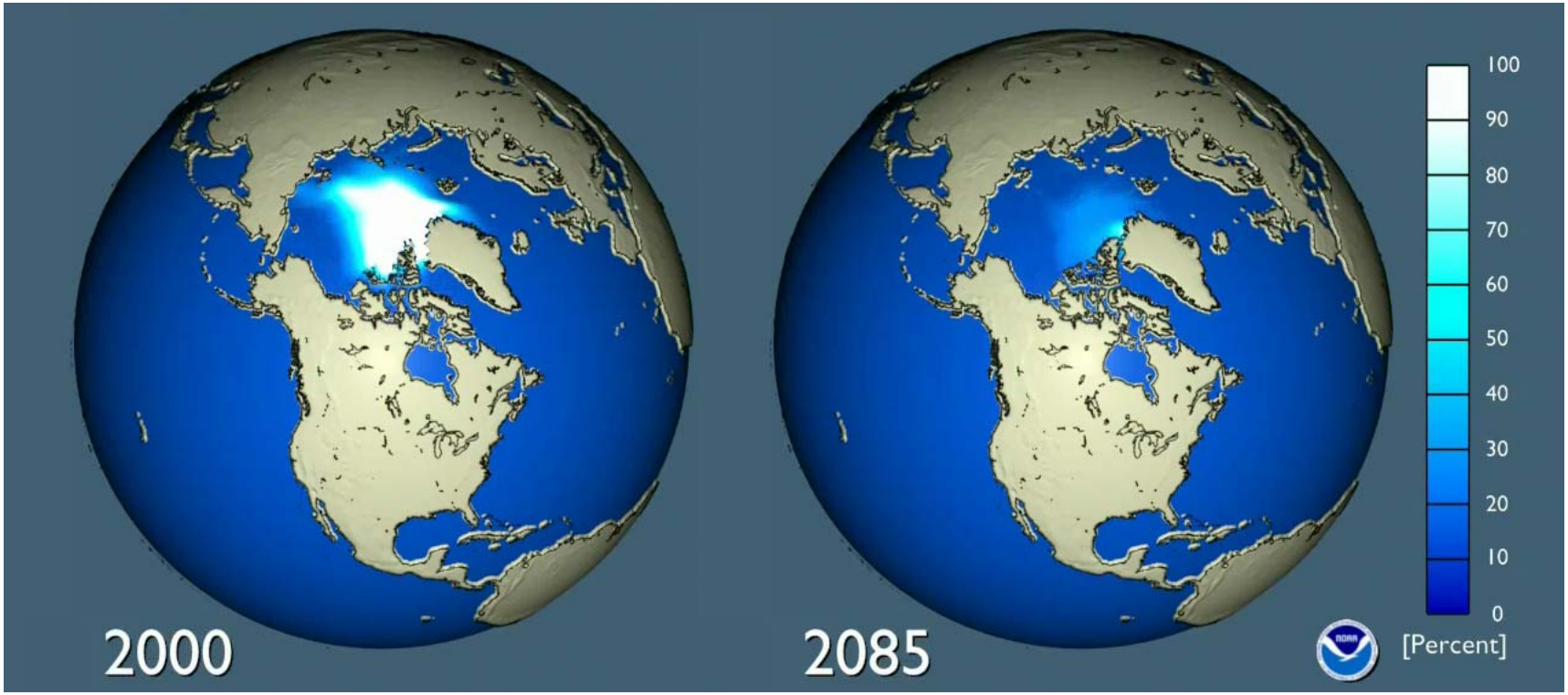

RCP 2.6
RCP 8.5
(a)
Change in average surface temperature (1986–2005 to 2081–2100)
32
39
−2 −1.5 −1 −0.5 0 0.5 1 1.5 2 3 4 5 7 9 11
(°C)
(b)
Change in average precipitation (1986–2005 to 2081–2100)
32
39
−50 −40 −30 −20 −10 0 10 20 30 40 50
(%)

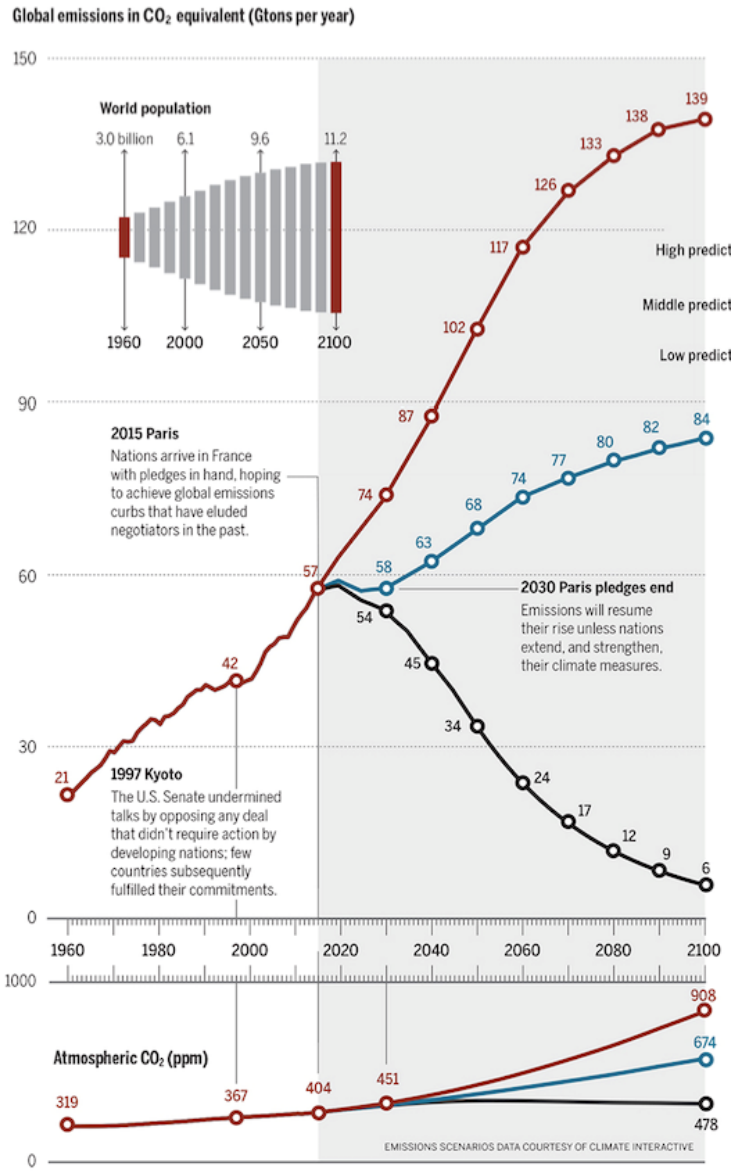

2000
2085
100
90
80
70
60
50
40
30
20
10
0
[Percent]

Cambiamenti climatici: quadro sintetico dei principali impatti attesi nel corso del XXI secolo

Settori e sistemi	Tipo di impatto	Nord	Atlantico	Centrale	Mediterraneo
Foreste arbusteti e prati	PPN forestale	↑↑↑	↑↑	↑ a ↓	↓
	Trasgr. long. e altitud. di specie arboree	↑↑↑	↑↑	↑↑	↑ a ↓
	Stabilità degli ecosistemi forestali	↓↓	↓	↓	↓↓↓
	PPN degli arbusteti (macchia, ecc.)	↑↑↑	↑↑↑	↑	↓↓↓
	Disturbi naturali (incendi, parassiti, uragani)	↓	↓	↓	↓↓↓
	PPN dei prati	↑↑↑	↑↑	↑ a ↓	↓↓↓
Bio-diversità	Piante	↓↓	↓↓	↓↓↓	↓↓↓
	Anfibi	↓↓	↓↓↓	↑↑	↓↓↓
	Rettili	↓↓	↓↓	↑↑	↓↓↓
	Mammiferi marini	↓↓↓	??	nd	↓↓↓
	Low-line coastal birds	↓↓↓	↓↓↓	nd	↓↓↓
Agricoltura e Pesca	Area disponibile per colture agrarie	↑↑↑	↑↑	↑	↓↓
	Superficie agricola utilizzata	↓↓	↓↓	↓↓	↓↓
	Coltura a ciclo estivo (mais, girasole)	↑↑↑	↑↑	↑	↓↓↓
	Colture a ciclo invernale (frumento, orzo, ecc.)	↑↑↑	↑↑	↑ a ↓	↓↓
	Fabbisogno irriguo	nd	↑ a ↓	↓↓	↓↓↓
	Colture a fine energetico	↑↑↑	↑↑	↑	↓↓
	Allevamenti	↑ a ↓	↓	↓↓	↓↓
	Pesca marittima	↑↑	↑	nd	↓

AFTER PARIS: THE ROCKY ROAD AHEAD

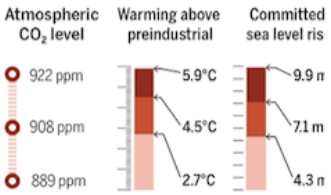
Officials call the Paris talks a beginning, but what's the destination? Below are three possible future paths for annual global greenhouse gas emissions. Models suggest each would produce very different ranges of atmospheric greenhouse gas levels and warming in 2100. And all would cause the seas to rise for centuries after 2100. — *Eli Kintisch*



Alternative worlds

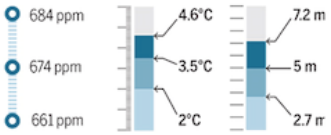
1. Business as usual

If nations don't fulfill their pledges,temperatures could rise by 2100 to levels not seen for millions of years. The world would be committed to centuries of sea level rise after 2100. (Range of sea levels shown for a 3.3°C rise.)



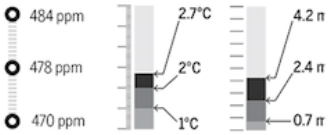
2. Paris pledges only

The Paris commitments are expected to cause global emissions to dip initially. But emissions will surge after 2030 if nations take no further action. (Range of sea levels shown for a 2.3°C rise.)



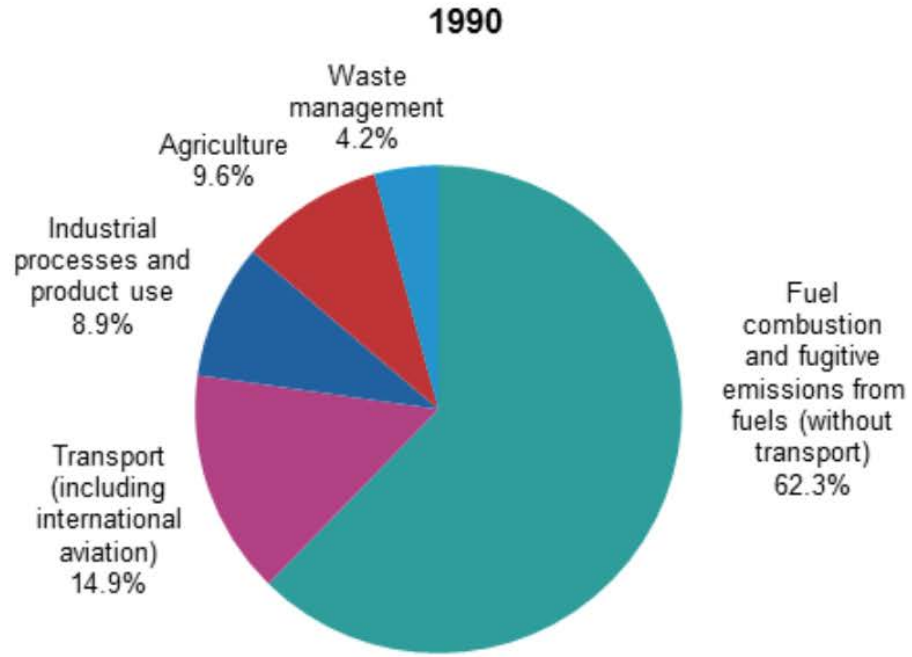
3. The path to 2°C

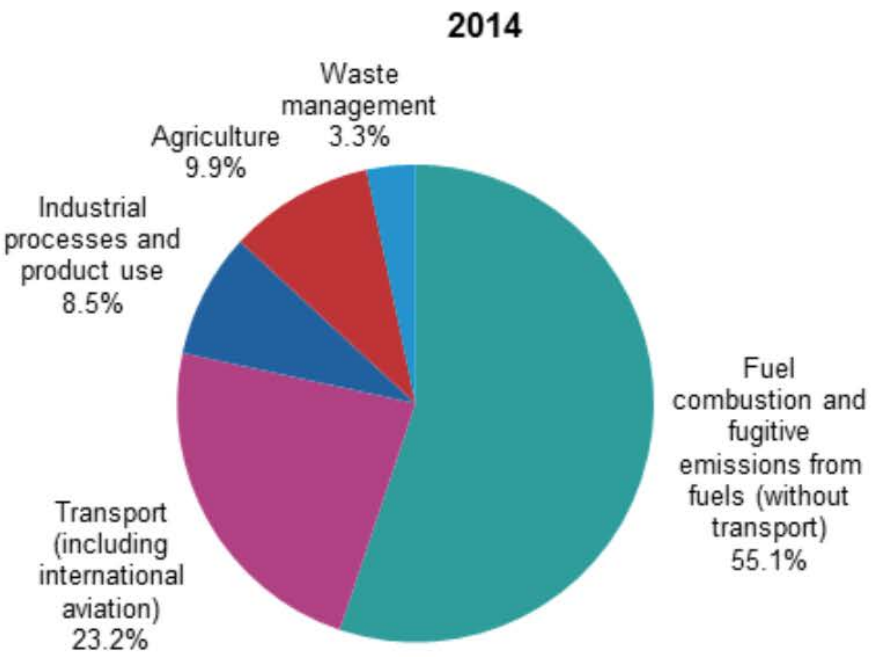
Avoiding dangerous warming will require no less than a global energy revolution. But even with aggressive action global coasts will see a battering from rising seas. (Range of sea levels shown for a 1.1°C rise.)



Lasting consequences

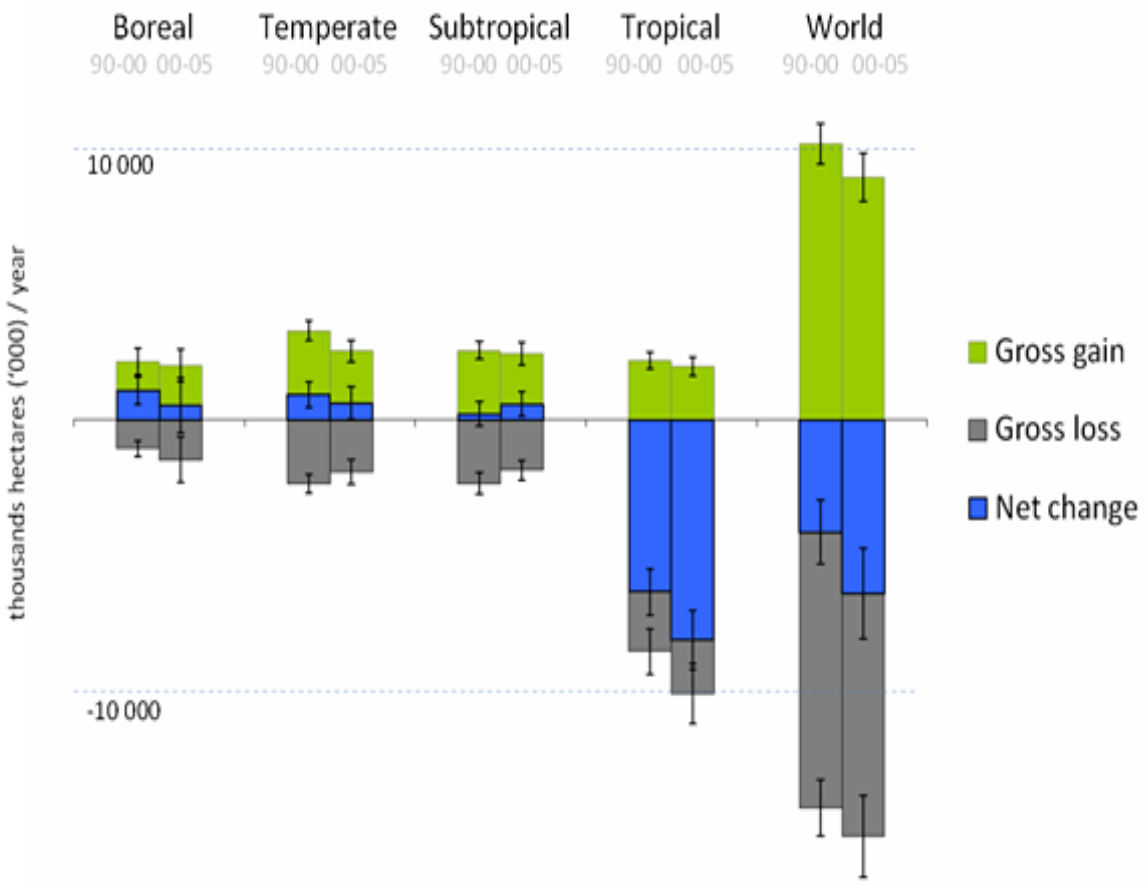
Even under the 2°C path, one measure of progress—atmospheric CO_2 levels (left)—will remain flat for centuries as the gas is very stable. Another benchmark, CO_2 equivalent (above) includes emissions of shorter lived gases such as methane, as well as emissions from agriculture and deforestation.

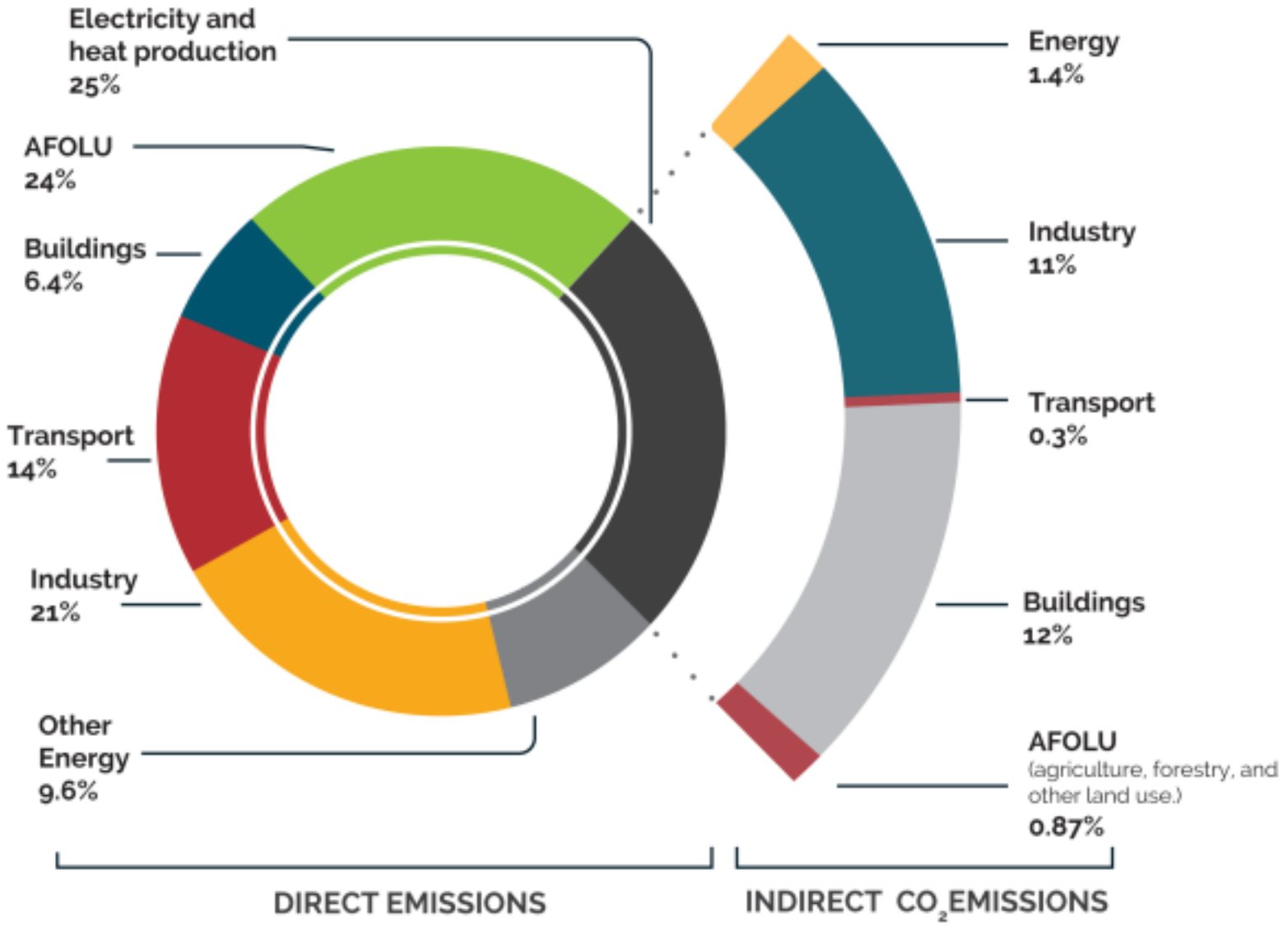

1990
Waste management 4.2%
Agriculture 9.6%
Industrial processes and product use 8.9%
Transport (including international aviation) 14.9%
Fuel combustion and fugitive emissions from fuels (without transport) 62.3%


2014
Waste management 3.3%
Agriculture 9.9%
Industrial processes and product use 8.5%
Transport (including international aviation) 23.2%
Fuel combustion and fugitive emissions from fuels (without transport) 55.1%

Trasformazione di uso del territorio

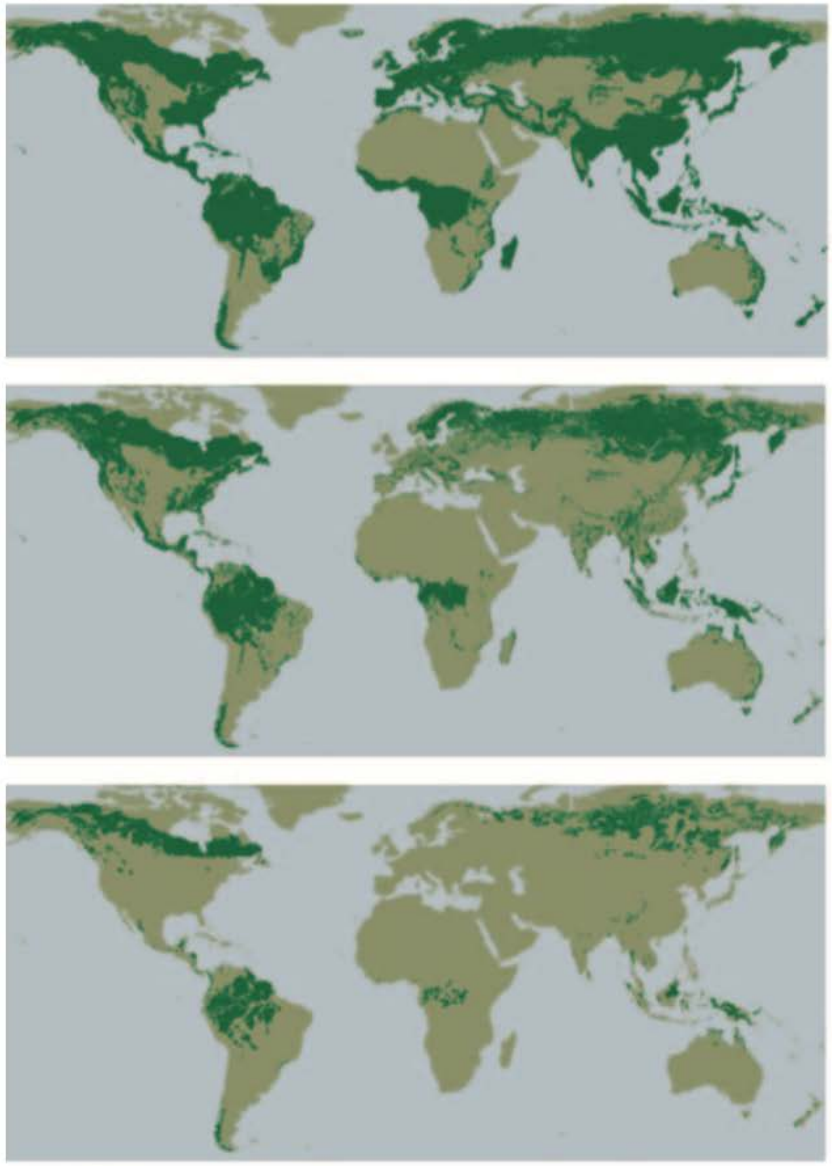
Annual net change was stable / positive in each climatic zone except the tropics




Electricity and heat production 25%
AFOLU 24%
Buildings 6.4%
Transport 14%
Industry 21%
Other Energy 9.6%
Energy 1.4%
Industry 11%
Transport 0.3%
Buildings 12%
AFOLU (agriculture, forestry, and other land use.) 0.87%
DIRECT EMISSIONS
INDIRECT CO_2 EMISSIONS

circa il 50% delle
emissioni CH4
derivano dal
settore agricolo

Figura 1.11 – Variazione della copertura forestale



Fonte: WRI

Planetary Boundaries:

Exploring the safe operating space for humanity in the Anthropocene

(*Nature*, 461 : 472 – 475, Sept 24 - 2009)

nature Vol 461|24 September 2009

FEATURE

A safe operating space for humanity

Identifying and quantifying planetary boundaries that must not be transgressed could help prevent human activities from causing unacceptable environmental change, argue **Johan Rockström** and colleagues.

SUMMARY

- New approach proposed for defining preconditions for human development
- Crossing certain biophysical thresholds could have disastrous consequences for humanity
- Three of nine interlinked planetary boundaries have already been overstepped

Although Earth has undergone many periods of significant environmental change, the planet's environment has been unusually stable for the past 10,000 years[1–3]. This period of stability — known to geologists as the Holocene — has seen human civilizations arise, develop and thrive. Such stability may now be under threat. Since the Industrial Revolution, a new era has arisen, the Anthropocene[4], in which human actions have become the main driver of global environmental change[5]. This could see human activities push the Earth system outside the stable environmental state of the Holocene, with consequences that are detrimental or even catastrophic for large parts of the world.

During the Holocene, environmental change occurred naturally and Earth's regulatory capacity maintained the conditions that enabled human development. Regular temperatures, freshwater availability and biogeochemical flows all stayed within a relatively narrow range. Now, largely because of a rapidly growing reliance on fossil fuels and industrialized forms of agriculture, human activities have reached a level that could damage the systems that keep Earth in the desirable Holocene state. The result could be irreversible and, in some cases, abrupt environmental change, leading to a state less conducive to human development[6]. Without pressure from humans, the Holocene is expected to continue for at least several thousands of years[7].

Planetary boundaries

To meet the challenge of maintaining the Holocene state, we propose a framework based on 'planetary boundaries'. These boundaries define the safe operating space for humanity with respect to the Earth system and are associated with the planet's biophysical subsystems or processes. Although Earth's complex systems sometimes respond smoothly to changing pressures, it seems that this will prove to be the exception rather than the rule. Many subsystems of Earth react in a nonlinear, often abrupt, way, and are particularly sensitive around threshold levels of certain key variables. If these thresholds are crossed, then important subsystems, such as a monsoon system, could shift into a new state, often with deleterious or potentially even disastrous consequences for humans[8,9].

Most of these thresholds can be defined by a critical value for one or more control variables, such as carbon dioxide concentration. Not all processes or subsystems on Earth have well-defined thresholds, although human actions that undermine the resilience of such processes or subsystems — for example, land and water degradation — can increase the risk that thresholds will also be crossed in other processes, such as the climate system.

We have tried to identify the Earth-system processes and associated thresholds which, if crossed, could generate unacceptable environmental change. We have found nine such processes for which we believe it is necessary to define planetary boundaries: climate change; rate of biodiversity loss (terrestrial and marine); interference with the nitrogen and phosphorus cycles; stratospheric ozone depletion; ocean acidification; global freshwater use; change in land use; chemical pollution; and atmospheric aerosol loading (see Fig. 1 and Table).

In general, planetary boundaries are values for control variables that are either at a 'safe' distance from thresholds — for processes with evidence of threshold behaviour — or at dangerous levels — for processes without

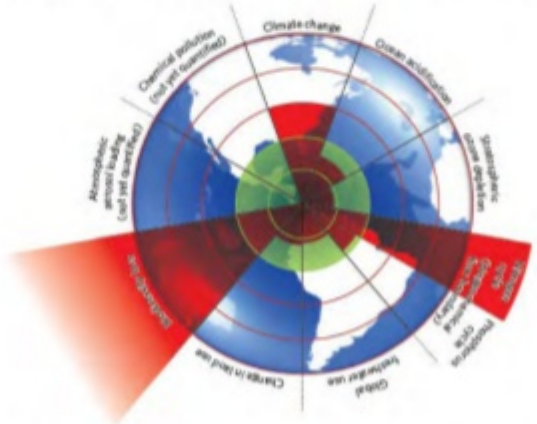


Figure 1 | Beyond the boundary. The inner green shading represents the proposed safe operating space for nine planetary systems. The red wedges represent an estimate of the current position for each variable. The boundaries in three systems (rate of biodiversity loss, climate change and human interference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

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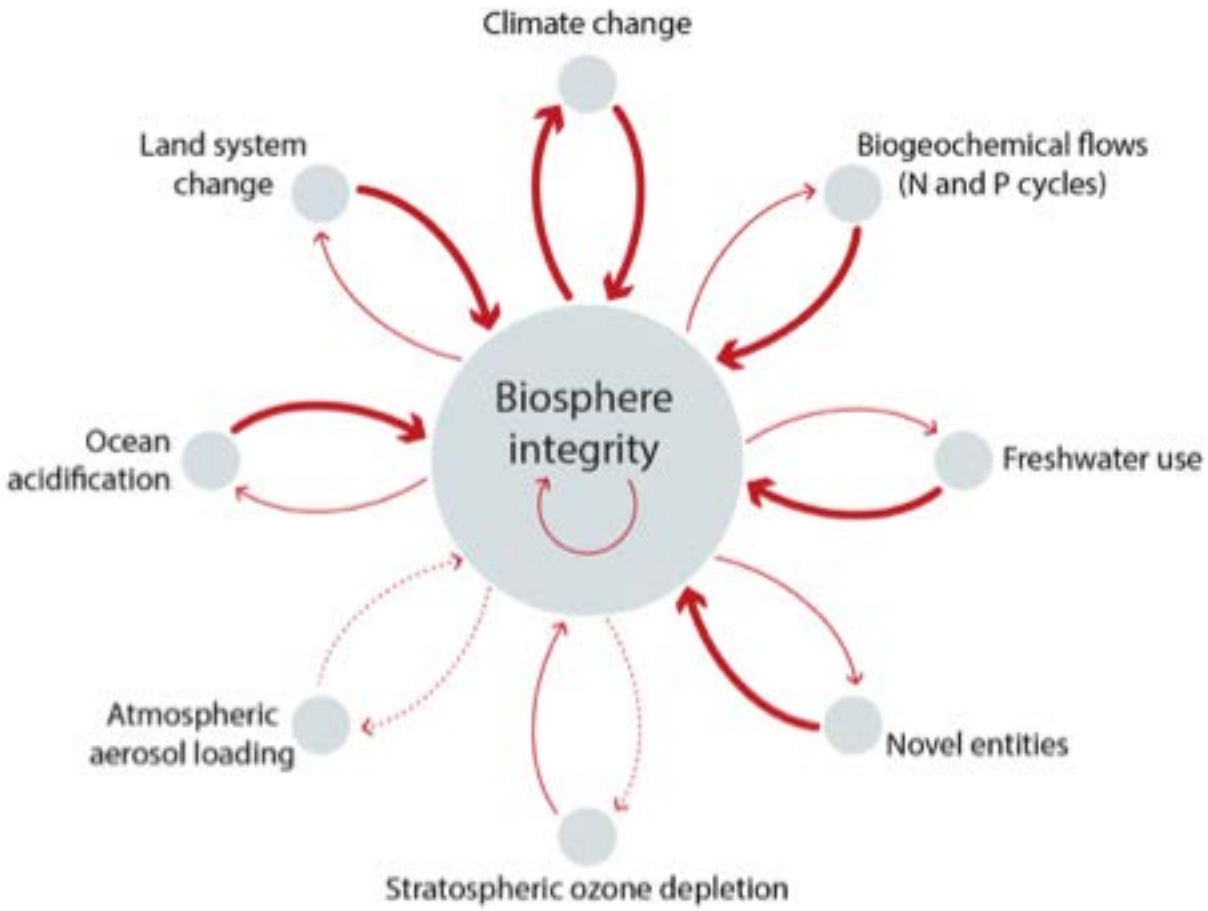

Climate change
Land system change
Biogeochemical flows (N and P cycles)
Biosphere integrity
Ocean acidification
Freshwater use
Atmospheric aerosol loading
Novel entities
Stratospheric ozone depletion

ISPRA
Istituto Superiore per la Protezione e la Ricerca Ambientale

Rapporto nazionale pesticidi nelle acque dati 2013-2014

Edizione 2016

244 / 2016

RAPPORTI

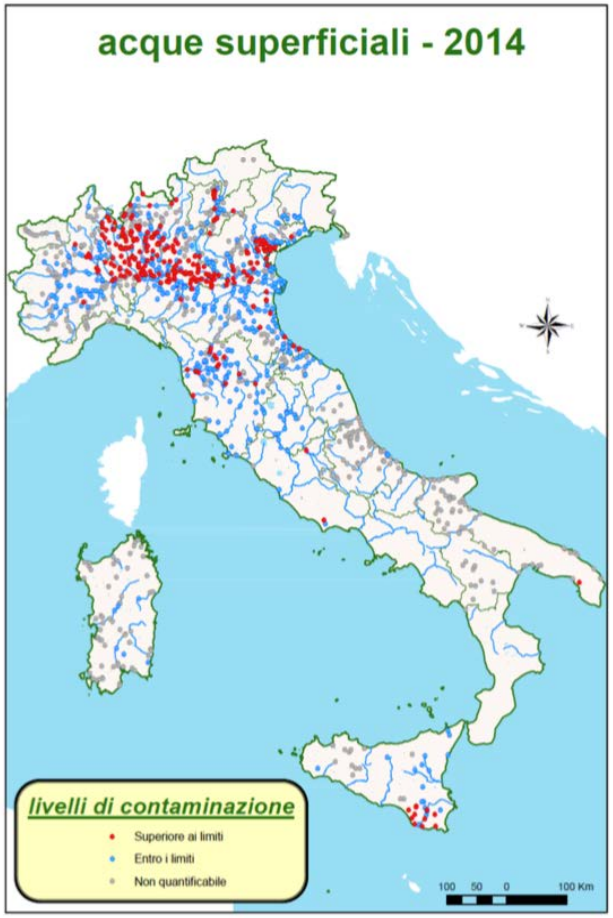


Fig. 6.2a – *Livelli di contaminazione delle acque superficiali, anno 2014.*

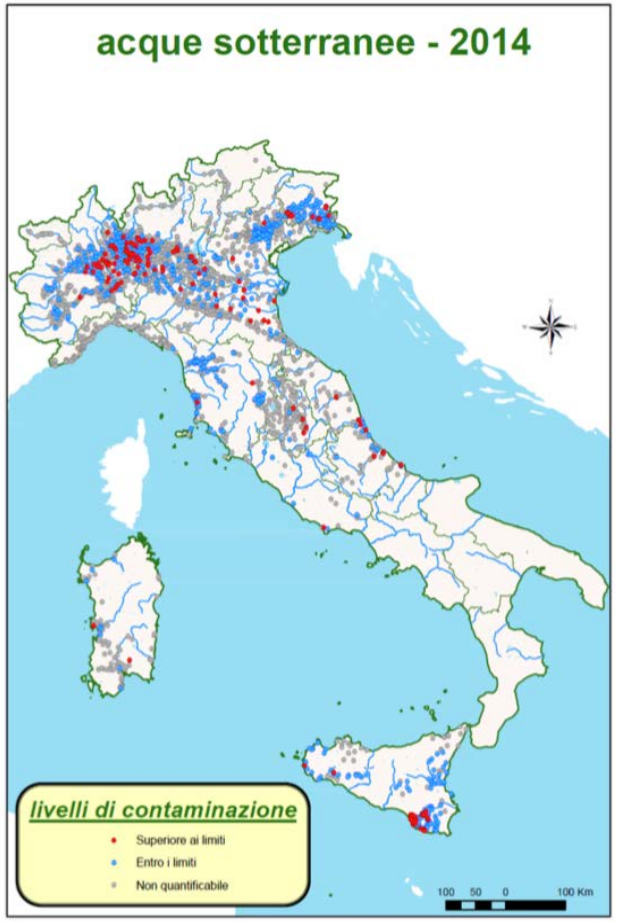


Fig. 6.2b – *Livelli di contaminazione delle acque sotterranee, anno 2014.*

L'agricoltura biologica ha una serie di obiettivi, come ad esempio ridurre gli impatti sull'ambiente sensu lato, promuovere la biodiversità, gestire sostenibilmente i paesaggi di alto valore, salvaguardare il benessere del bestiame, produrre cibo di qualità, ...

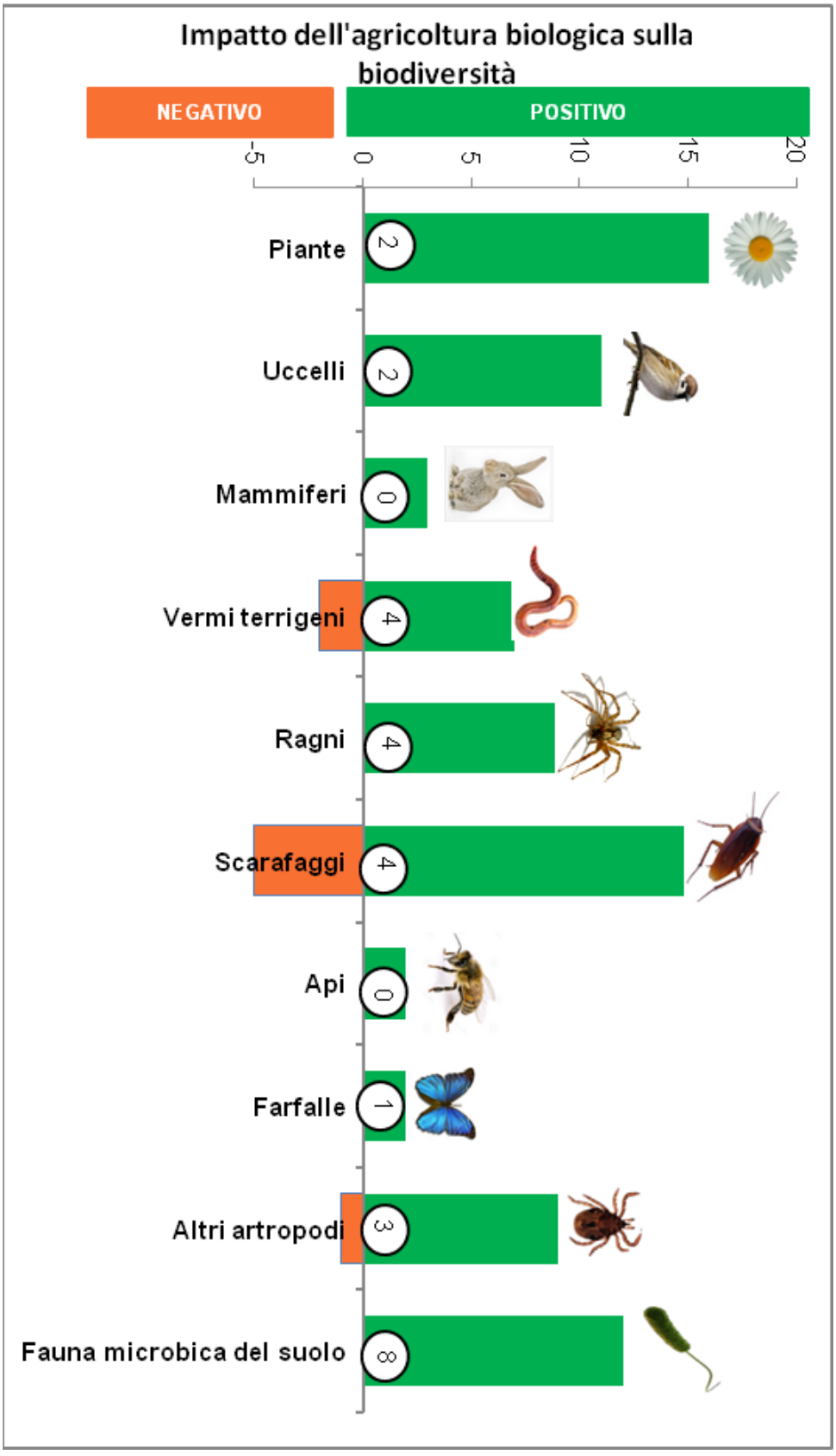
Le pratiche bio e in particolare l'impiego di soli concimi organici e di rimedi biologici in luogo di pesticidi e fertilizzanti sintetici, hanno un impatto positivo sulla biodiversità, ad esempio aumentando la concentrazione di microfauna, quali anellidi, coleotteri e aracnidi nel terreno, preziosissimi per preservare lo stato funzionale e produttivo del suolo.

La rotazione delle colture, contribuisce poi a favorire la biodiversità a livello genetico e di specie.

Infine, scegliendo di coltivare varietà autoctone di piante e razze animali,si continua ad agire a tutela della biodiversità, proteggendo la specificità esistente nelle differenti aree geografiche. A tale riguardo, una ricerca condotta da Royal Society mostra come, rispetto ai terreni coltivati con metodi convenzionali, nei terreni biologici sia possibile rilevare un numero doppio di specie vegetali, fino al 50% in più di aracnidi, il 60% in più di avifauna e il 75% in più di chirotteri.

La maggior parte degli studi confermano quindi senza incertezze come l'agricoltura biologica favorisca e supporti elevati livelli di biodiversità

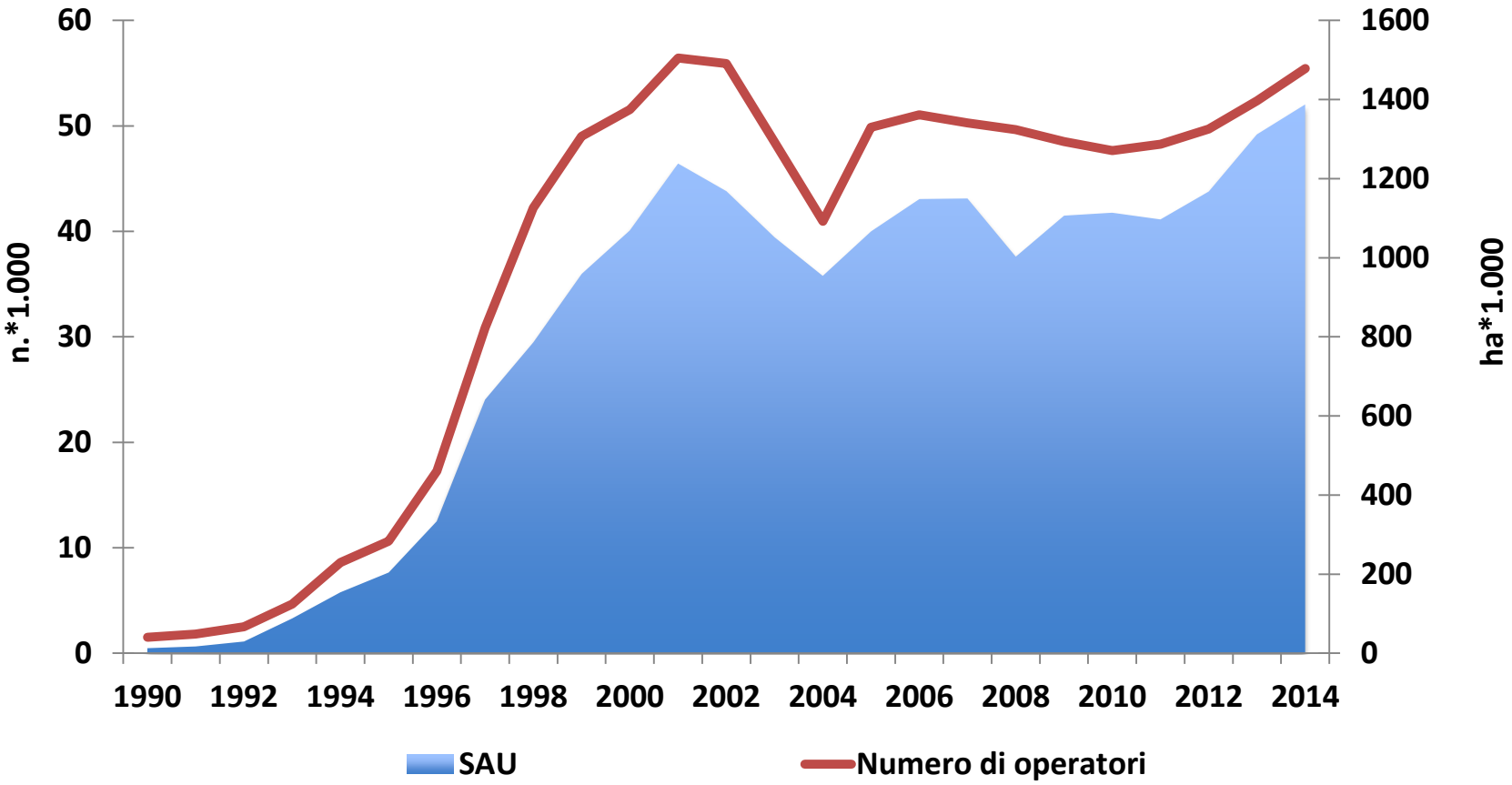
Gli *habitat* agricoli caratterizzati da una maggiore ricchezza di specie posseggono anche maggiore capacità di adattamento e resilienza agli stress ambientali, inclusi quelli legati ai cambiamenti climatici.


Impatto dell'agricoltura biologica sulla biodiversità
NEGATIVO
POSITIVO
-5
0
5
10
15
20
Piante
2
Uccelli
2
Mammiferi
0
Vermi terrigeni
4
Ragni
4
Scarafaggi
4
Api
0
Farfalle
1
Altri artropodi
3
Fauna microbica del suolo
8

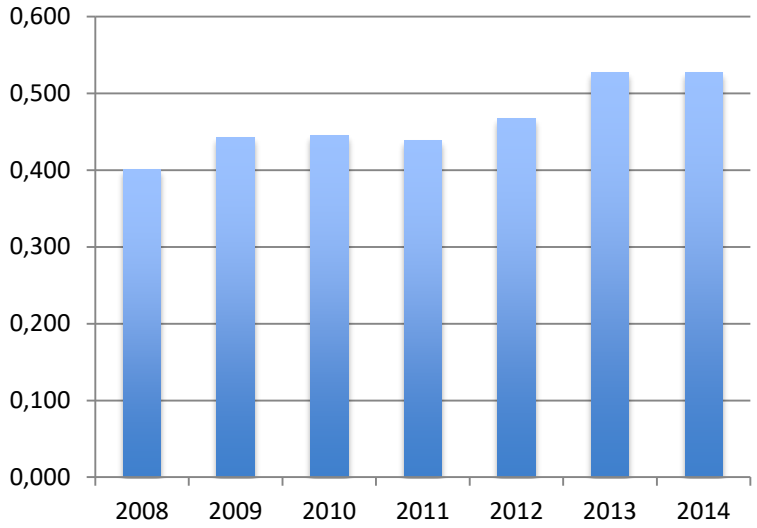
L’agricoltura biologica fornisce anche una chiave per risolvere il problema del cambiamento climatico: l'agricoltura biologica è un’opzione per produrre cibo e fibre che utilizza le risorse con parsimonia, è climate-friendly, e offre ampie possibilità di adattamento ai cambiamenti climatici.
L’agricoltura, come detto, è attualmente responsabile del 25% delle emissioni globali di gas a effetto serra (contando emissioni agricole dirette e indirette), può comunque contribuire sia mitigazione dei cambiamenti climatici e adattamento.
Il potenziale di mitigazione principale risiede nella capacità dei terreni agricoli di sequestrare CO2 attraverso la costruzione, la sintesi, di materia organica, attraverso dinamiche interne al suolo, più o meno complesso, spesso ancora da investigare. Questo potenziale può essere realizzato impiegando pratiche agricole sostenibili, come quelle che si trovano comunemente nei sistemi di agricoltura biologica. Esempi di queste pratiche sono l'uso di fertilizzanti organici e rotazione delle colture, il sovescio, l’inerbimento, le colture di copertura.

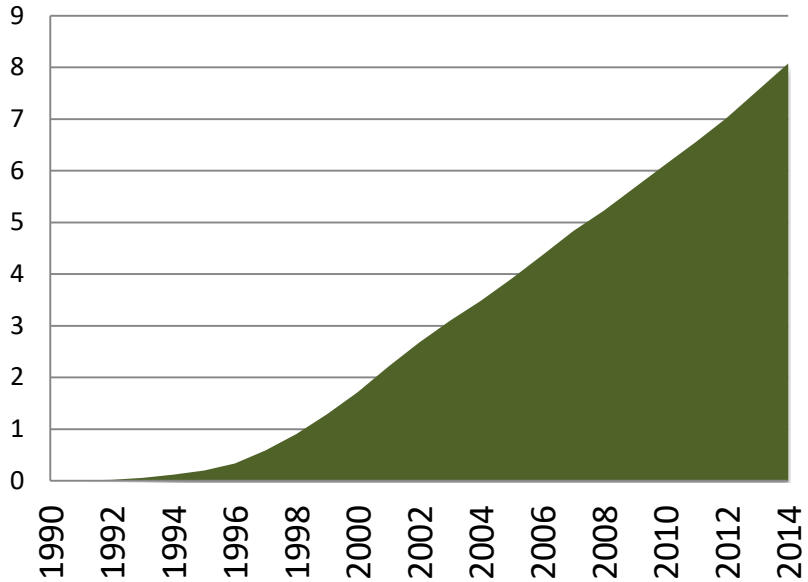
		Item	No details										
		Element											
Country	Year		Area, all [ha]	Area, share of total [%]	Exports, all [Mio €]	Import, all [Mio €]	Operators, exporters	Operators, importers	Operators, processors	Operators, producers	Sales, all [Mio €] (retail)	Sales, all [€/person] (retail)	Sales, all: Growth (value) 1 year [%] (retail)
Australia	2014		17'150'000.00	4.19	247.76	107.08			719.00	1'707.00	961.60	41.57	
Austria	2014		525'521.00	19.42	79.70		9.00	23.00	2'118.00	22'184.00	1'064.70	127.00	
Argentina	2014		3'061'965.00	2.18	122.26		125.00		289.00	1'018.00			
Italy	2014		1'387'913.35	10.84	1'420.00*			259.00	12'641.00	48'662.00	2'145.19	35.29	6.20
Spain	2014		1'710'475.12	6.87	589.70	201.00	67.00	127.00	3'082.00	30'602.00	998.00	20.90	
United States of America	2014		2'178'470.98	0.64	2'408.73	980.00*				12'880.00	27'062.10	85.29	11.20*

Agricoltura biologica: evoluzione in Italia del numero di operatori e della superficie agricola utilizzata (SAU) (1990-2014)



Annual (left) and cumulative (right) carbon sequestration in soils managed according to organic farming system in Italy (MtC)





La mitigazione si realizza in agricoltura biologica anche attraverso la non combustione della biomassa (i residui colturali) e il non uso dei fertilizzanti sintetici.

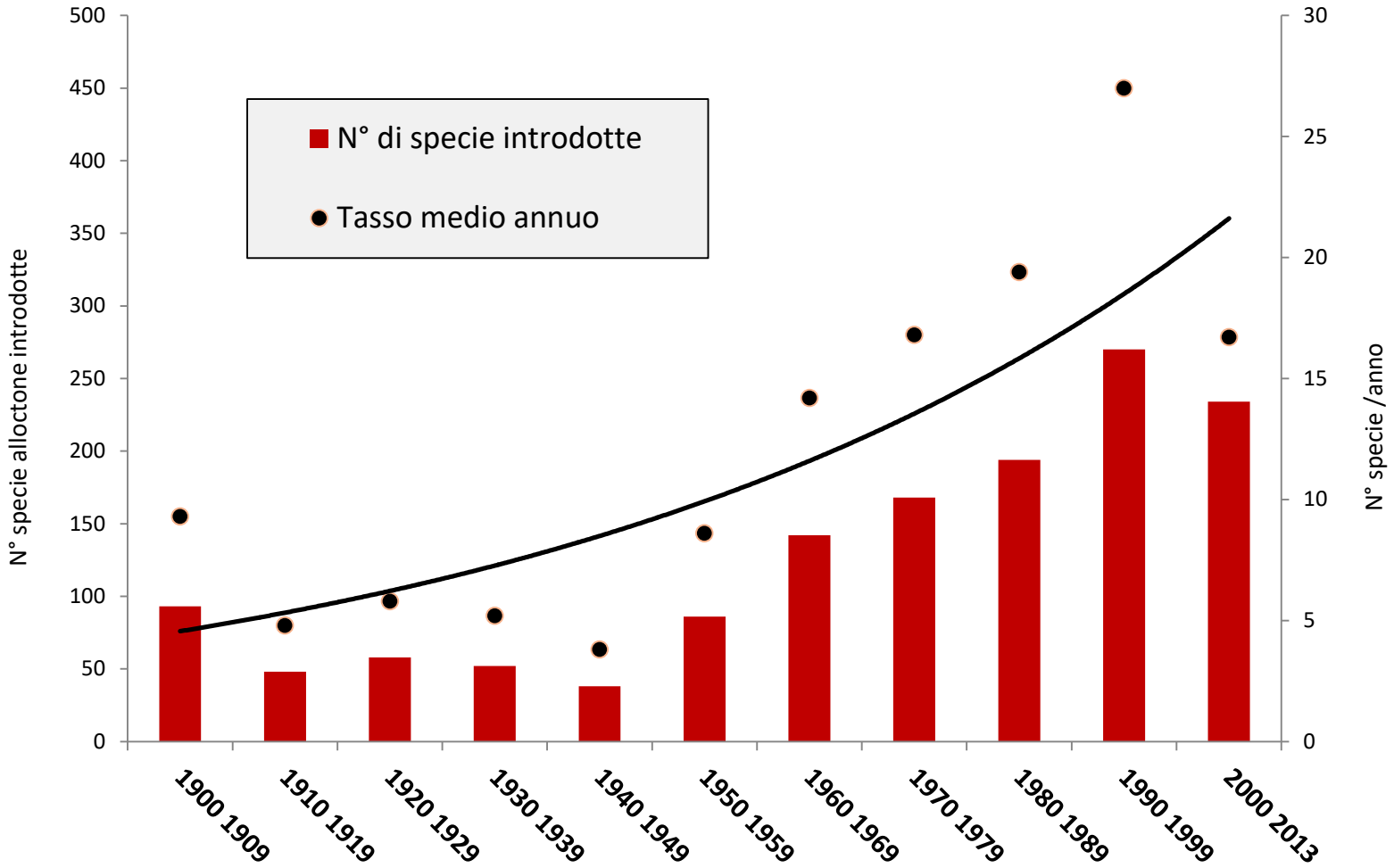
Le pratiche biologiche contribuiscono all'adattamento, il secondo pilastro su cui si fonda la strategia internazionale di lotta ai cambiamenti climatici

Infatti la sintesi di sostanza organica del suolo aumenta la capacità di ritenzione idrica, crea più terreni più stabili e fertili, riducendo in tal modo la vulnerabilità alla siccità, precipitazioni estreme, alluvioni.

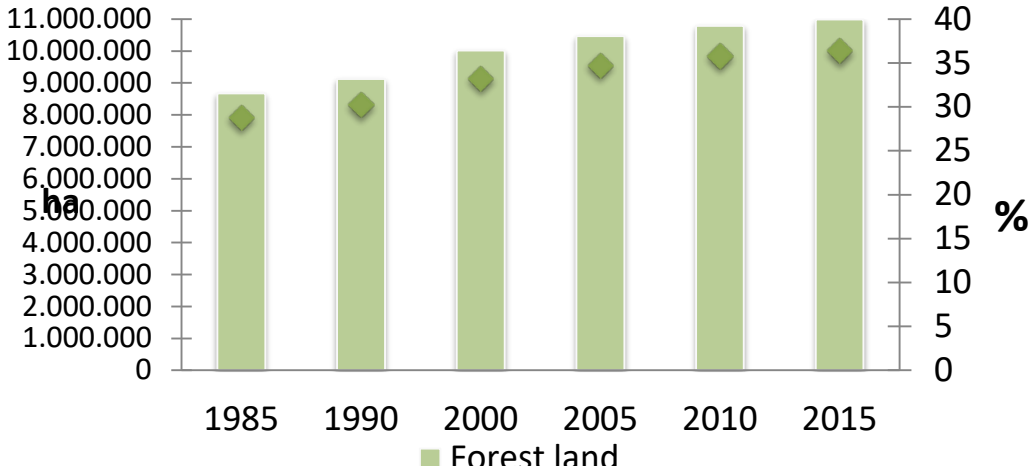
L'adattamento è ulteriormente supportato dalla maggiore diversità agro-ecosistema delle aziende biologiche, a causa di ridotte immissioni di azoto e l'assenza di pesticidi chimici.

L'elevata diversità e i costi di produzione più bassi dell'agricoltura biologica sono fondamentali per ridurre i rischi di produzione associati alle condizioni meteorologiche estreme.

Ovviamente queste pratiche vantaggiose non sono esclusive dell'agricoltura biologica. Tuttavia, esse sono parti fondamentali del sistema di produzione biologica, diversamente dalla maggior parte dell'agricoltura non biologica, convenzionale, dove giocano solo un ruolo minore.



Number of species introduced to Italy since 1900 and average annual rate of introductions, estimated on 1,383 species of documented introduction
Source: ISPRA, 2014. National Data Base on Allochthonous Species


11.000.000
10.000.000
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0
ha
40
35
30
25
20
15
10
5
0
%
1985
1990
2000
2005
2010
2015
Forest land