



Εθνικό Μετσόβιο Πολυτεχνείο
Σχολή Πολιτικών Μηχανικών

Υπερπληθυσμός και περιβαλλοντικός ντετερμινισμός

Γ.-Φοίβος Σαργέντης

Παρουσίαση βασισμένη στο paper: Sargentis, G.-F.; Koutsoyiannis, D.; Angelakis, A.; Christy, J.; Tsonis, A.A. Environmental Determinism vs. Social Dynamics: Prehistorical and Historical Examples. World 2022, 3, 357-388.

<https://doi.org/10.3390/world3020020>

<https://youtu.be/7r-57KP90U8>

Ιούλιος 2023



Artificial intelligence & 3D printing. Ο ρόλος του μηχανικού
Κλιματική αλλαγή
Μεταβαλλόμενα τοπία (πυρκαγιές, μεταβολές χλωρίδας)
Τοπίο και έργα υποδομής
Ο ρόλος του πλέγματος νερού-ενέργειας-τροφίμων



Βόρεια Εύβοια, κάμπινγκ Ροβιές
Κόστος διανυκτέρευσης 5 €/ημέρα

Δηλώσεις συμμετοχής
email: fivos@itia.ntua.gr

Προθεσμία υποβολής δηλώσεων: 31.5.2023 (θέσεις περιορισμένες)

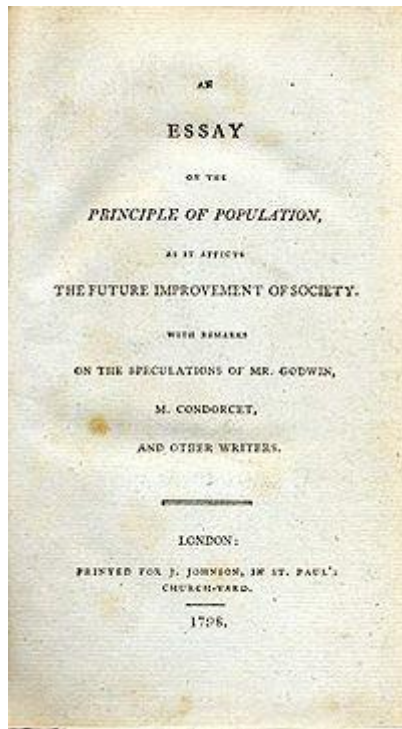


ADDOPTML

Υπερπληθυσμός & περιβαλλοντικός ντετερμινισμός

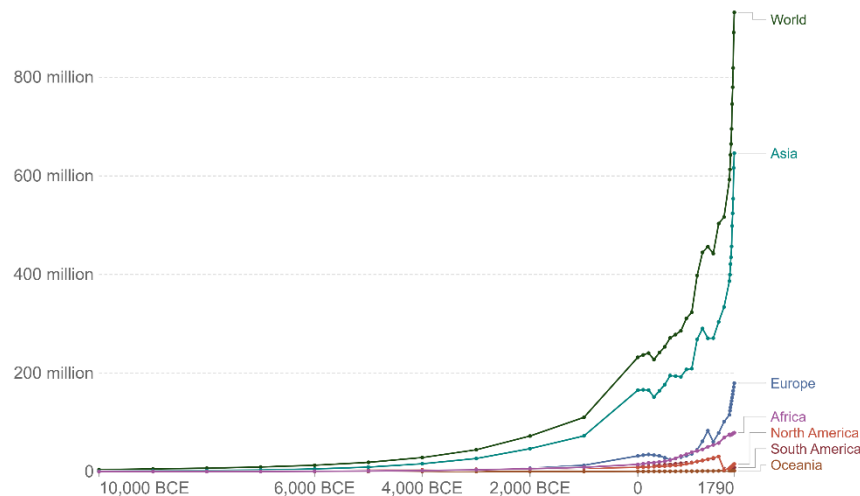


Thomas Robert Malthus (1766–1834)



Malthus, T.R. An Essay on the Principle of Population; J. Johnson: London, UK, 1798.

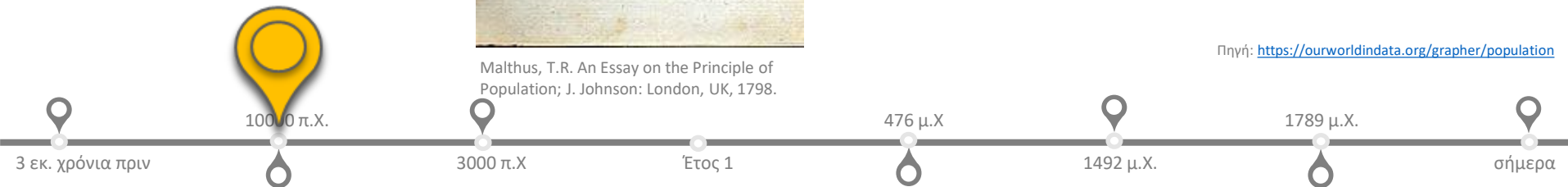
Population, 10,000 BCE to 1790



Source: HYDE (2017); Gapminder (2022); UN (2022)
Note: Historical country data is shown based on today's geographical borders.

OurWorldInData.org/world-population-growth • CC BY

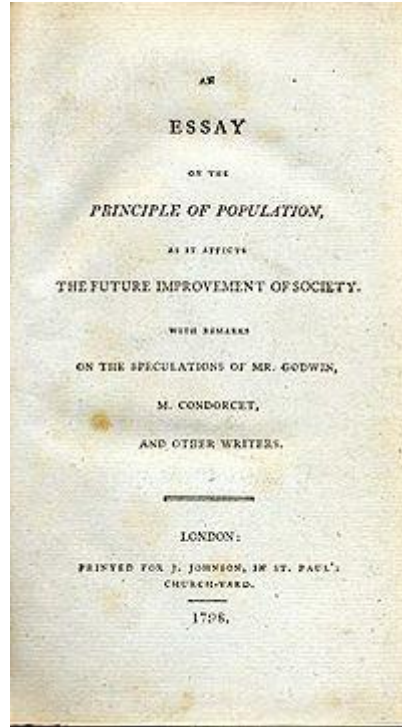
Πηγή: <https://ourworldindata.org/grapher/population>



Υπερπληθυσμός & περιβαλλοντικός ντετερμινισμός

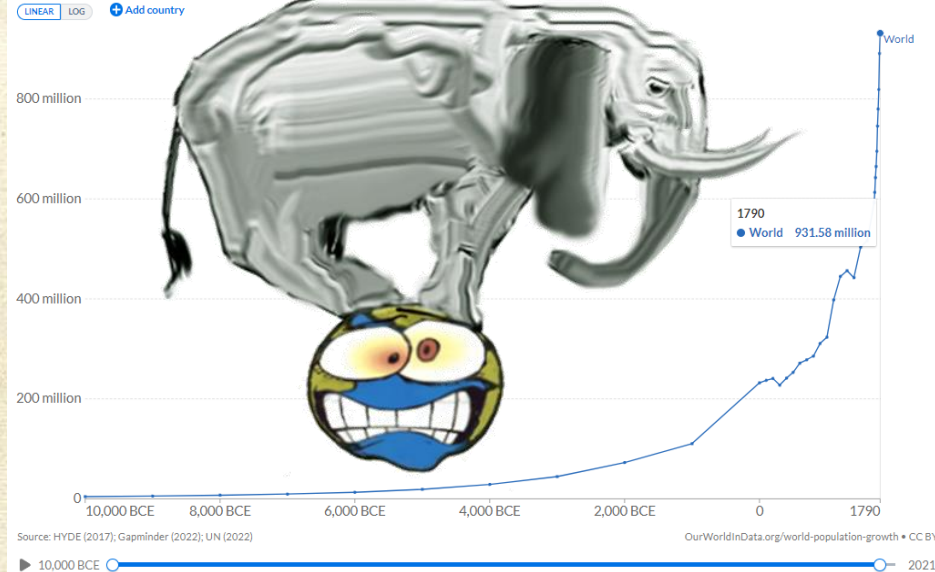


Thomas Robert Malthus (1766–1834)

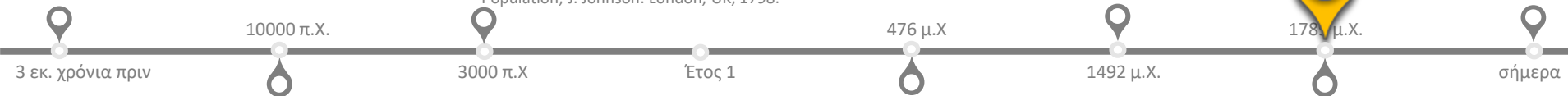


Malthus, T.R. An Essay on the Principle of Population; J. Johnson: London, UK, 1798.

Population, 10,000 BCE to 1790



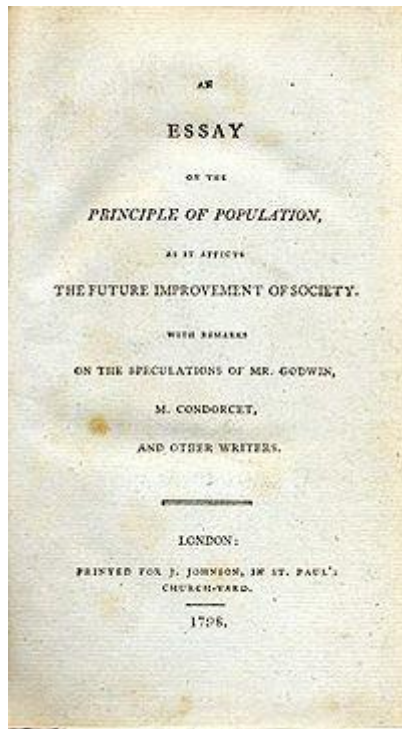
Πηγή: <https://ourworldindata.org/grapher/population>



Υπερπληθυσμός & περιβαλλοντικός ντετερμινισμός

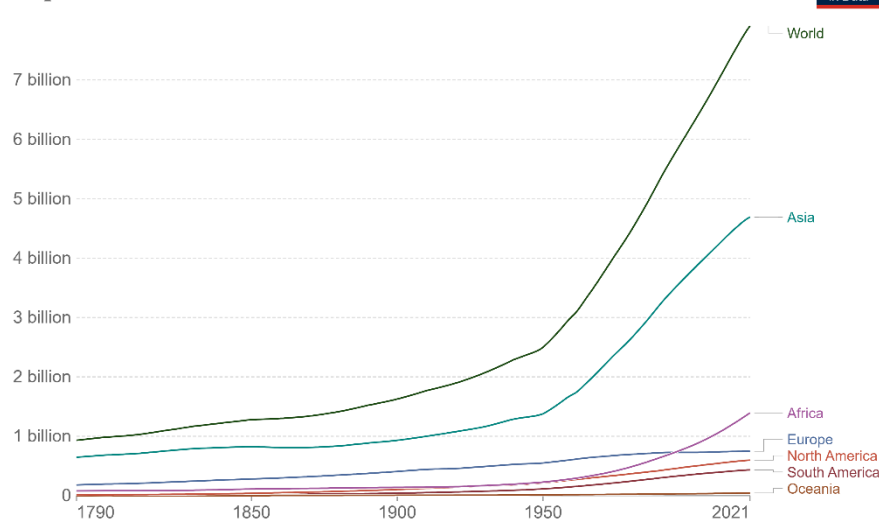


Thomas Robert Malthus (1766–1834)



Malthus, T.R. An Essay on the Principle of Population; J. Johnson: London, UK, 1798.

Population, 1790 to 2021

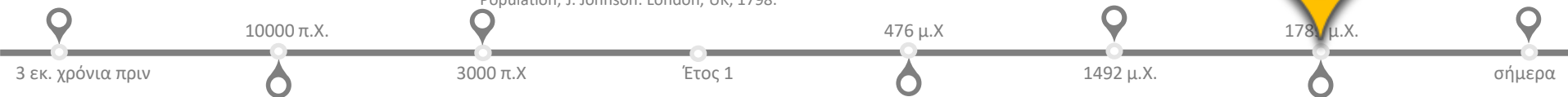


Source: HYDE (2017); Gapminder (2022); UN (2022)

Note: Historical country data is shown based on today's geographical borders.

OurWorldInData.org/world-population-growth • CC BY

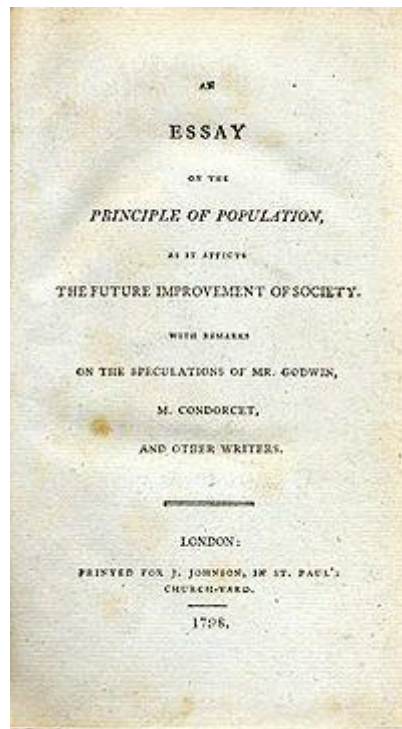
Πηγή: <https://ourworldindata.org/grapher/population>



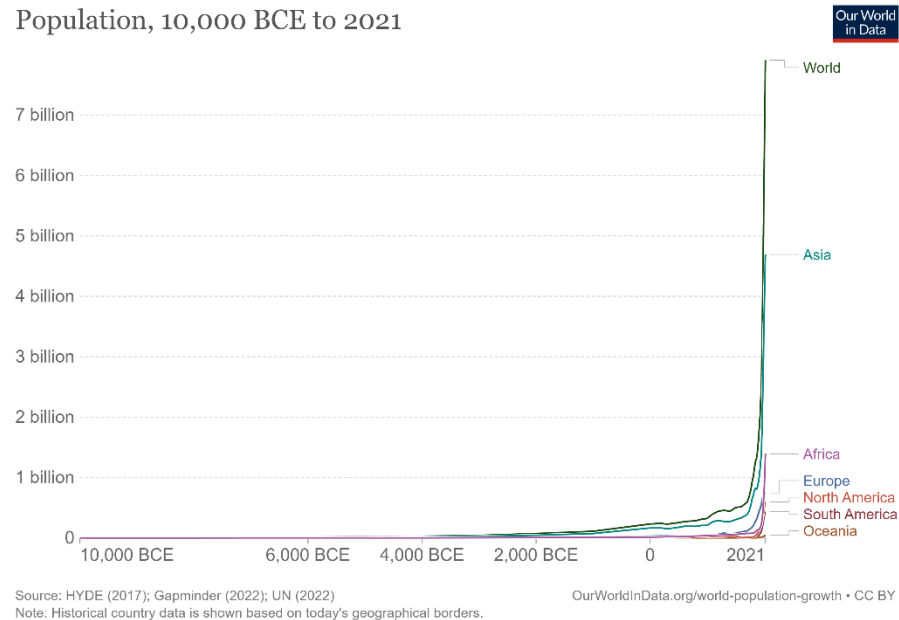
Υπερπληθυσμός & περιβαλλοντικός ντετερμινισμός



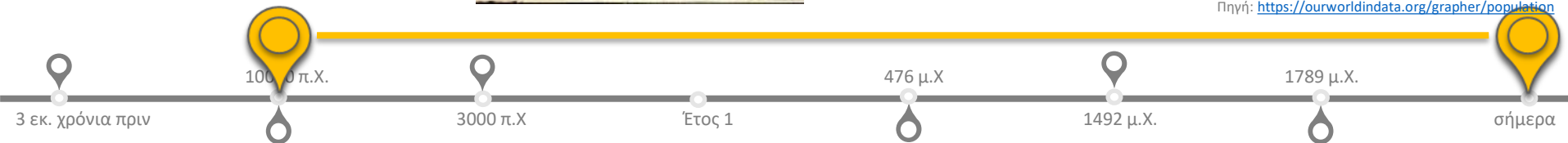
Thomas Robert Malthus (1766–1834)



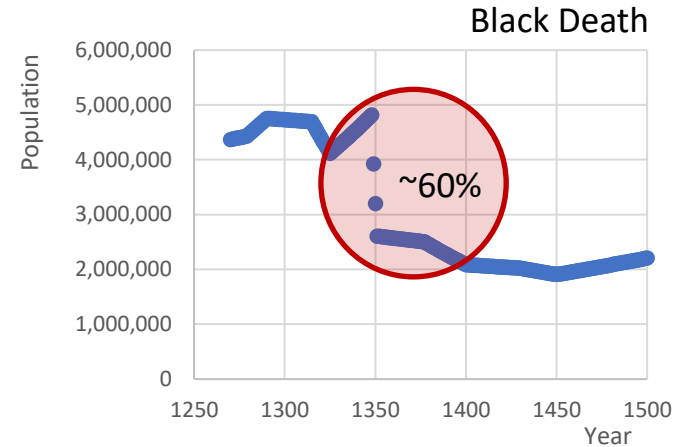
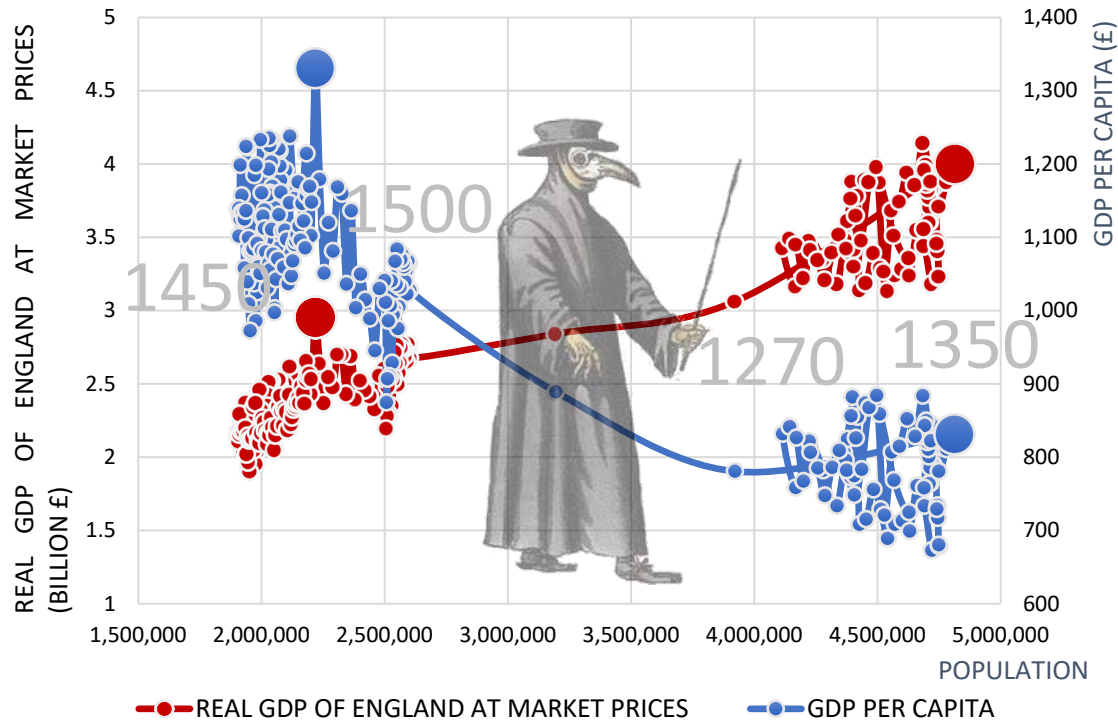
Population, 10,000 BCE to 2021



Πηγή: <https://ourworldindata.org/grapher/population>



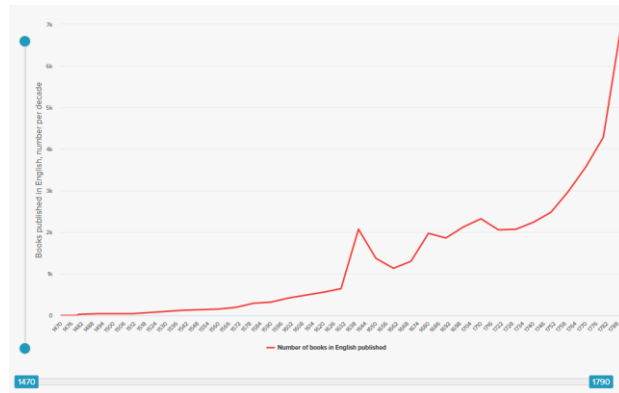
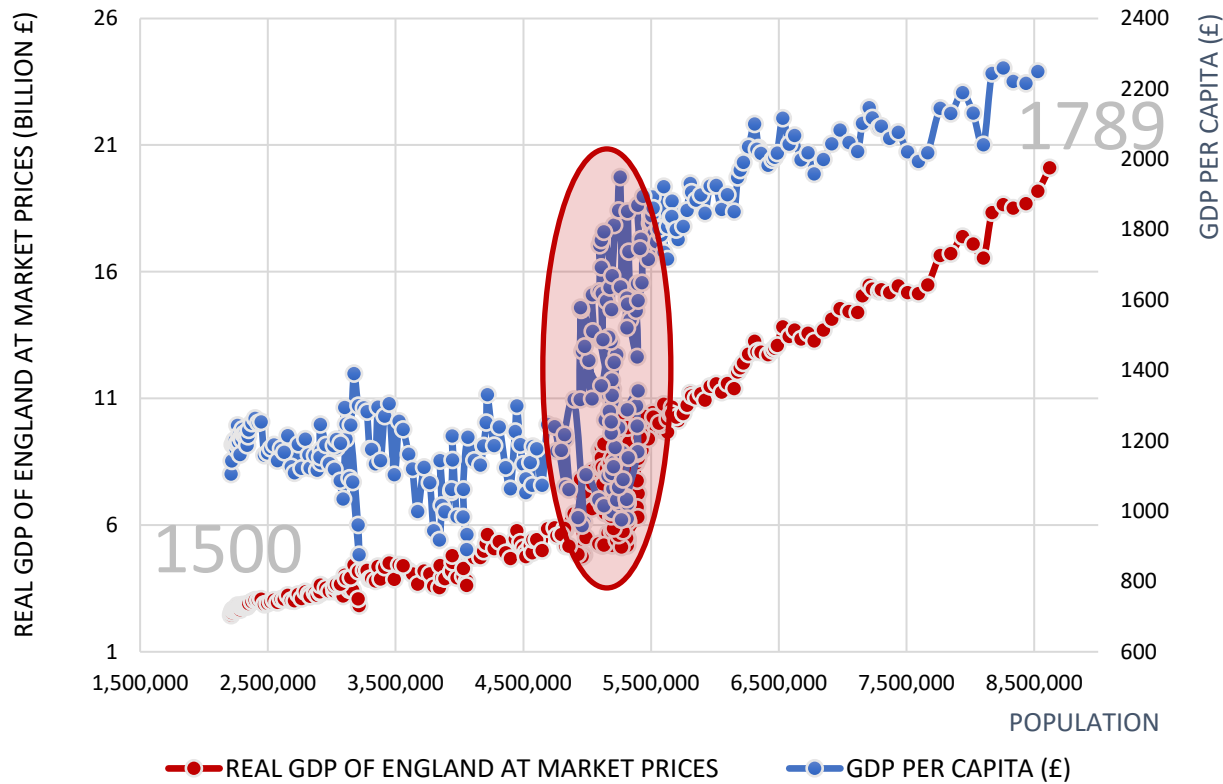
Η Μαλθουσιανή παγίδα



Πηγή: <https://www.bankofengland.co.uk/statistics/research-datasets>



Μήπως ξεφύγαμε από τις Μαλθουσιανές παγίδες?



Books published in English
number per decade, 1470–1790

Πηγές:

1. <https://www.bankofengland.co.uk/statistics/research-datasets>
2. <https://www.humanprogress.org/dataset/books-published-in-english/>

1500



1492 μ.Χ.

1789 μ.Χ.

σήμερα

476 μ.Χ.

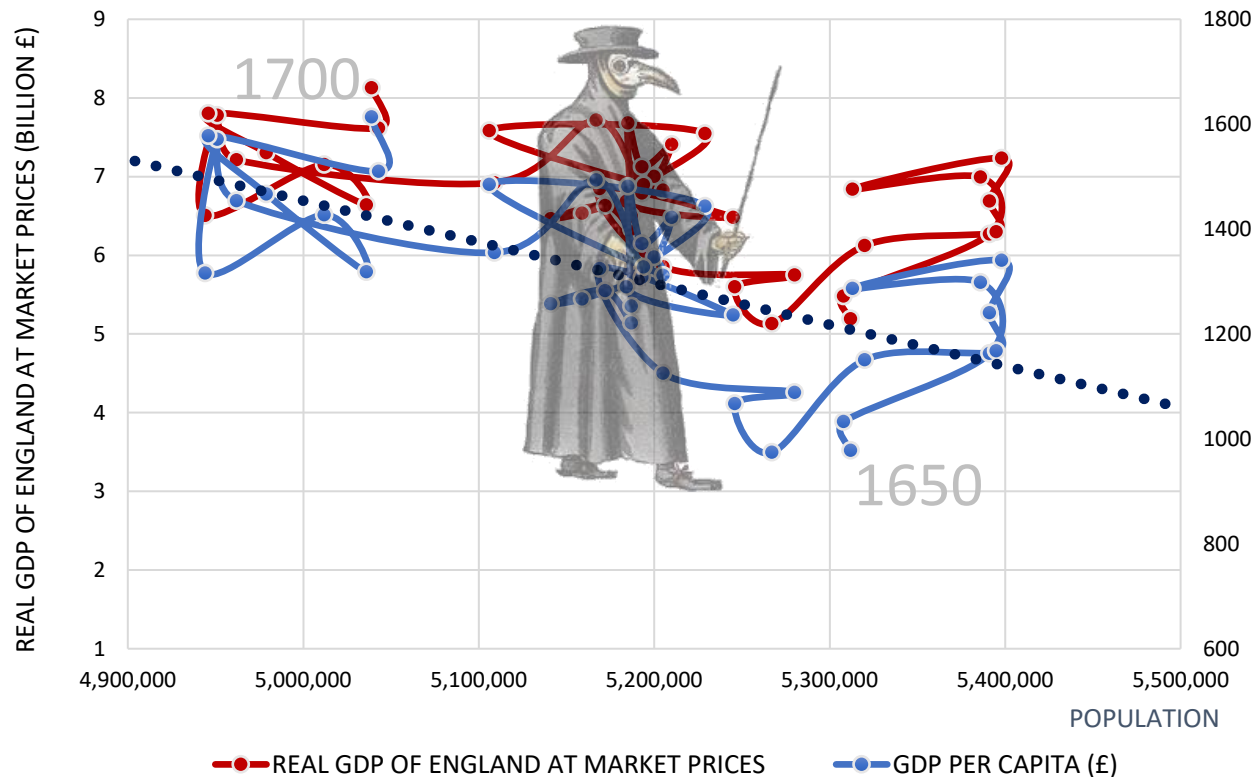
Έτος 1

3000 π.Χ

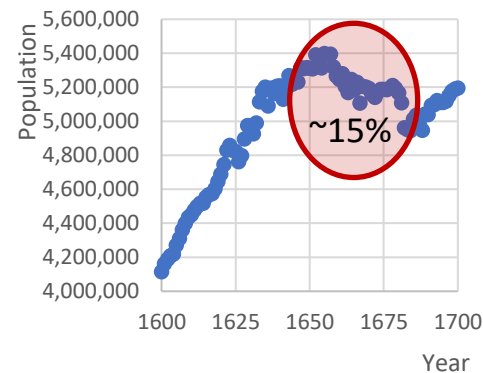
10000 π.Χ.

3 εκ. χρόνια πριν

Μαλθουσιανή παγίδα και πάλι!



Great Plague of London



Πηγή: <https://www.bankofengland.co.uk/statistics/research-datasets>

1650

1700



1789 μ.Χ.

1492 μ.Χ.

476 μ.Χ.

Έτος 1

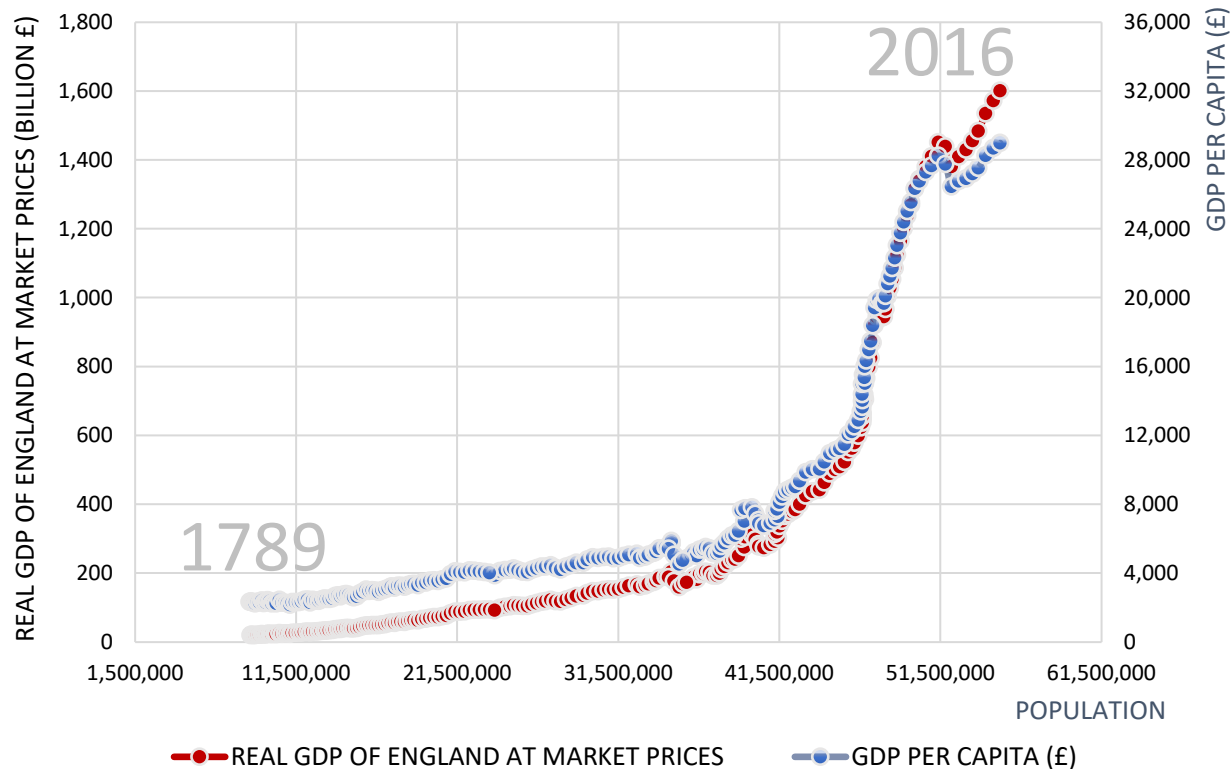
3000 π.Χ.

10000 π.Χ.

3 εκ. χρόνια πριν

σήμερα

Μαλθουσιανή παγίδα: η πρώτη ανατροπή



Πηγή: <https://www.bankofengland.co.uk/statistics/research-datasets>

1789



1789 μ.Χ.

σήμερα

1492 μ.Χ.

476 μ.Χ.

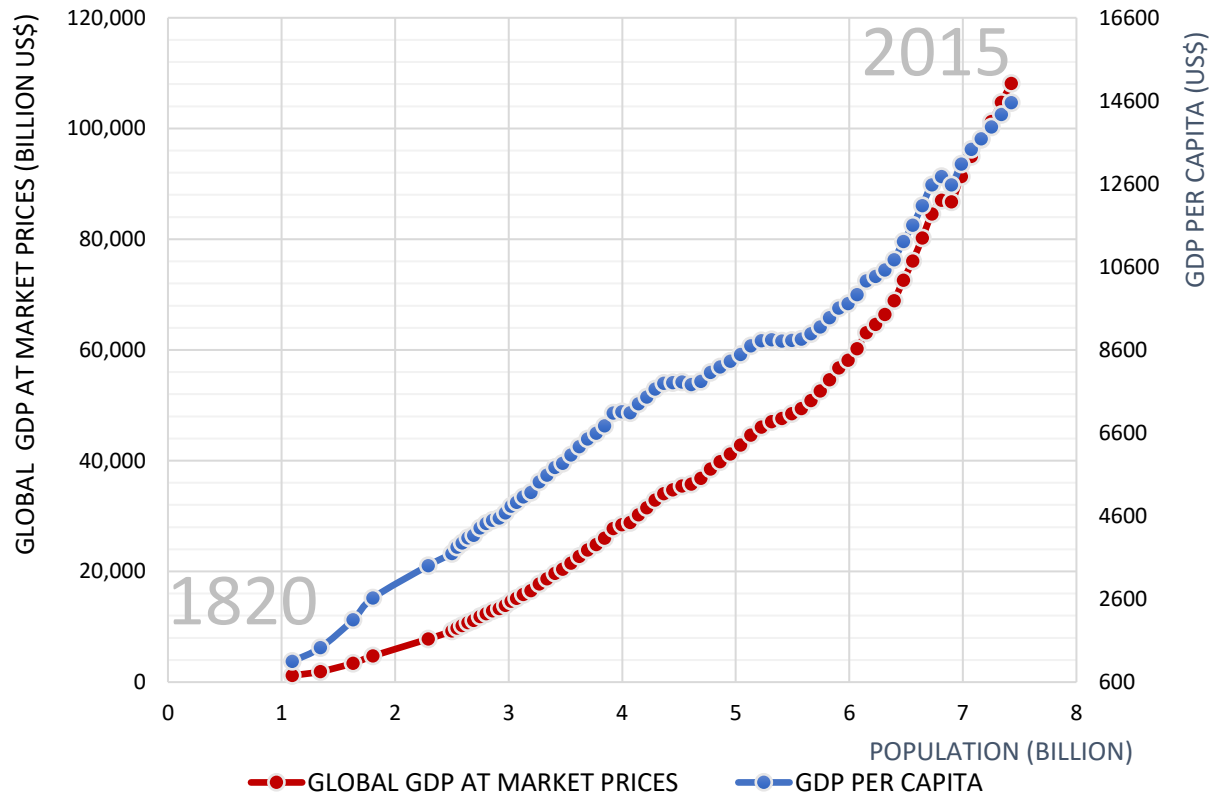
Έτος 1

3000 π.Χ.

10000 π.Χ.

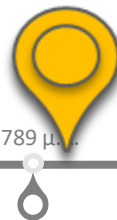
3 εκ. χρόνια πριν

Μαλθουσιανή παγίδα: η δεύτερη ανατροπή



Πηγές: <https://ourworldindata.org/economic-growth>
<https://ourworldindata.org/world-population-growth>

1820



1789 μ.Χ.

σήμερα

1492 μ.Χ.

476 μ.Χ.

Έτος 1

3000 π.Χ.

10000 π.Χ.

3 εκ. χρόνια πριν

Πως σπάει η Μαλθουσιανή παγίδα_1



Πηγή: <https://youtu.be/NUAreQT2E5I>

~1850



10000 π.Χ.



3000 π.Χ.

Έτος 1

476 μ.Χ.



1492 μ.Χ.

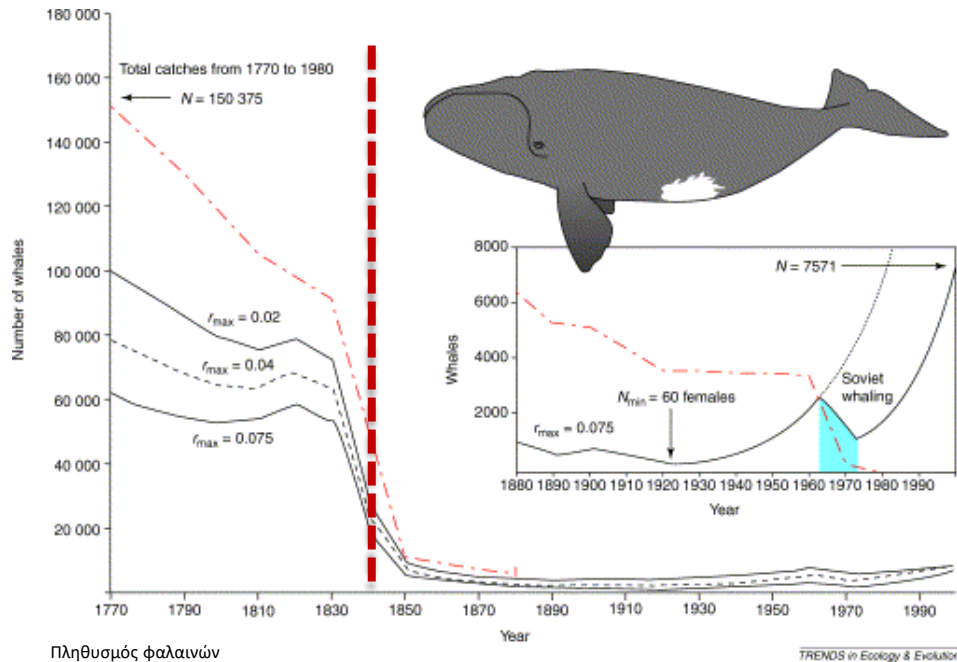
1789 μ.Χ.



σήμερα

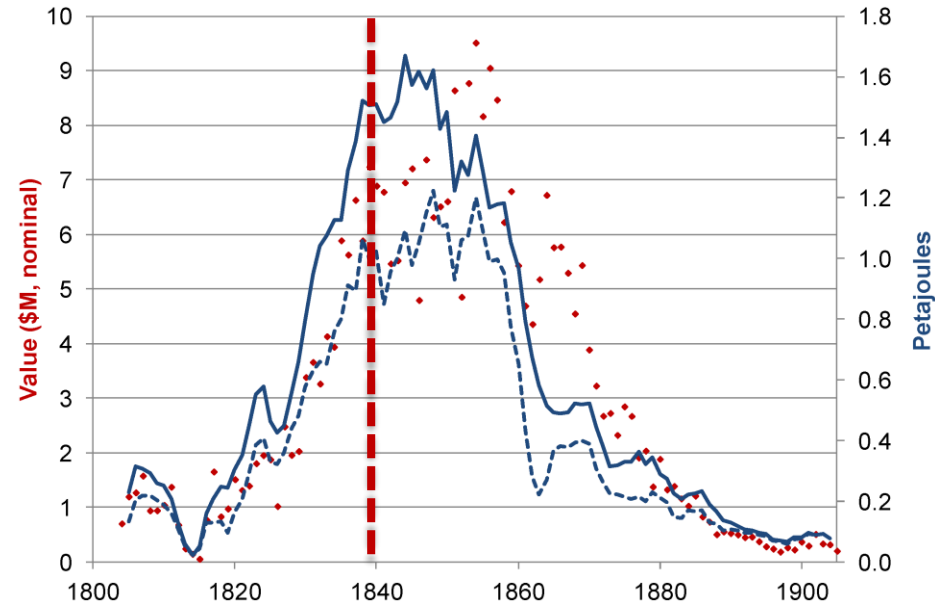
3 εκ. χρόνια πριν

Πως σπάει η Μαλθουσιανή παγίδα_1



Πληθυσμός φαλαινών

Πηγή: C. Scott Baker, Phillip J. Clapham, Modelling the past and future of whales and whaling, Trends in Ecology & Evolution, Volume 19, Issue 7, 2004.

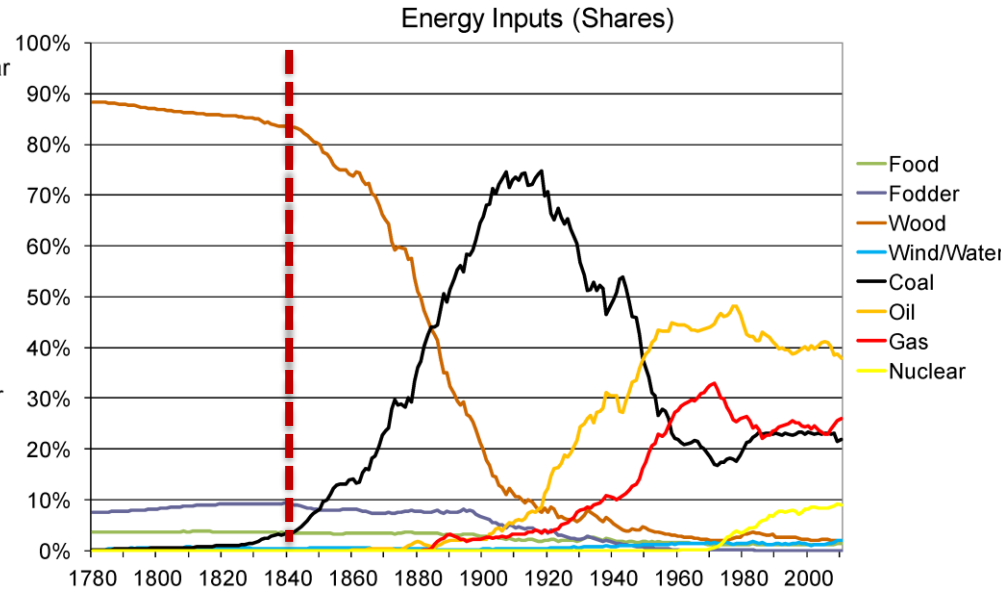
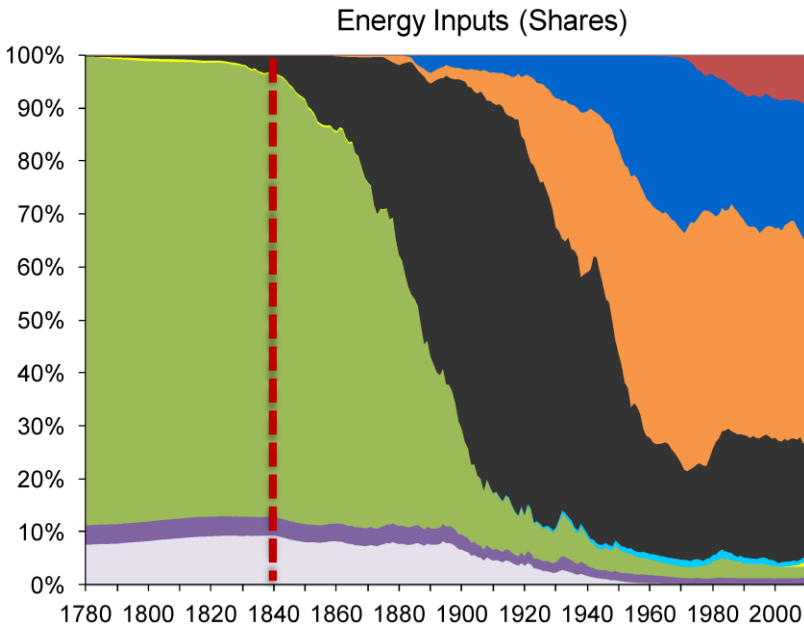


- Total Value — 3-year domestic consumption — 3-year production average
- Λάδι φάλαινας, παραγωγή, κατανάλωση και τιμή

Πηγή: O'Connor, P.A.; Cleveland, C.J. U.S. Energy Transitions 1780–2010. Energies 2014, 7, 7955–7993.
<https://doi.org/10.3390/en7127955>



Πως σπάει η Μαλθουσιανή παγίδα_1



Πηγή: O'Connor, P.A.; Cleveland, C.J. U.S. Energy Transitions 1780–2010. *Energies* 2014, 7, 7955–7993.
<https://doi.org/10.3390/en7127955>



Πως σπάει η Μαλθουσιανή παγίδα_2



Πηγές:

1. Chiu, I. The Evolution from Horse to Automobile: a Comparative International Study. Cambria Press, New York 2008.
2. Levitt, S. D.; Dubner, S. J. Superfreakonomics. Allen Lane, London 2010.
3. Brandon, K. Did Cars Save Our Cities From Horses – Issue 7: Waste. Nautilus, 7 Nov. 2013
4. https://youtu.be/v-5Ts_i164c; https://youtu.be/FeAhVq_dB3A



Πως σπάει η Μαλθουσιανή παγίδα_2



Πηγές:

1. Chiu, I. The Evolution from Horse to Automobile: a Comparative International Study. Cambria Press, New York 2008.
2. Levitt, S. D.; Dubner, S. J. Superfreakonomics. Allen Lane, London 2010.
3. Brandon, K. Did Cars Save Our Cities From Horses – Issue 7: Waste. Nautilus, 7 Nov. 2013
4. https://youtu.be/v-5Ts_i164c; https://youtu.be/FeAhVq_dB3A

~1900



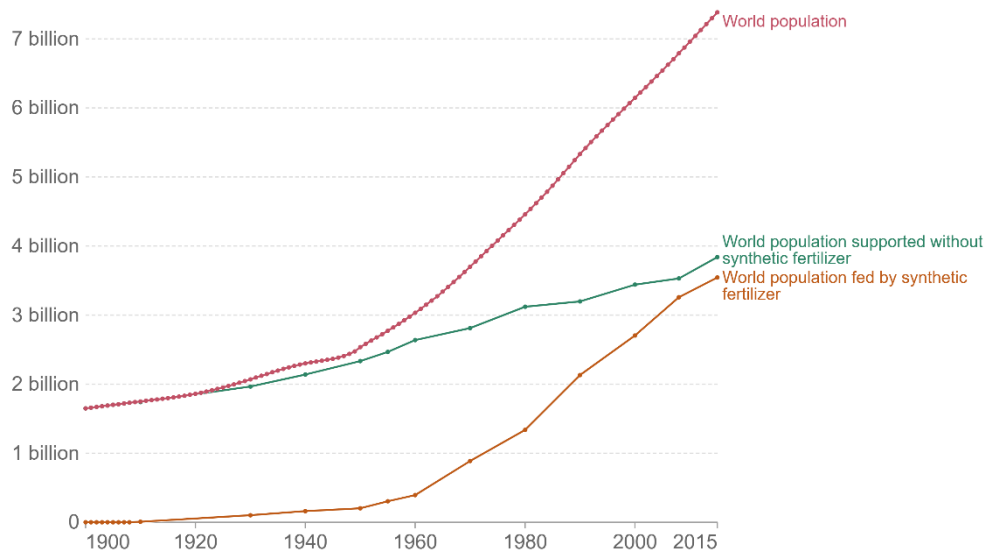
Πως σπάει η Μαλθουσιανή παγίδα_3

Πηγή: <https://ourworldindata.org/grapher/world-population-with-and-without-fertilizer>

World population with and without synthetic nitrogen fertilizers

Our World
in Data

Estimates of the global population reliant on synthetic nitrogenous fertilizers, produced via the Haber-Bosch process for food production. Best estimates project that just over half of the global population could be sustained without reactive nitrogen fertilizer derived from the Haber-Bosch process.



Source: Erisman et al. (2008); Smil (2002); Stewart (2005)

OurWorldInData.org/how-many-people-does-synthetic-fertilizer-feed/ • CC BY

1900



10000 π.Χ.



3000 π.Χ.

Έτος 1

476 μ.Χ.



1492 μ.Χ.

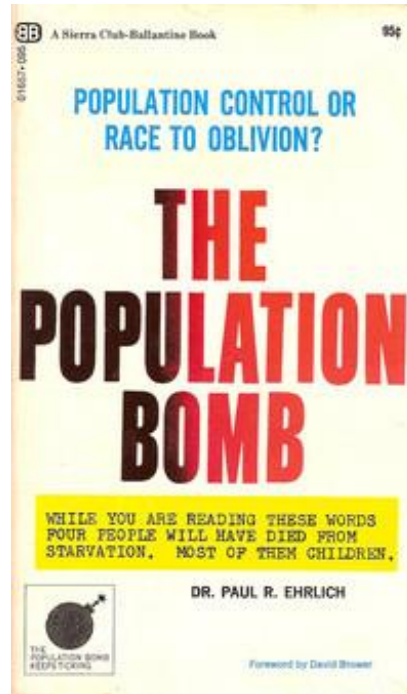
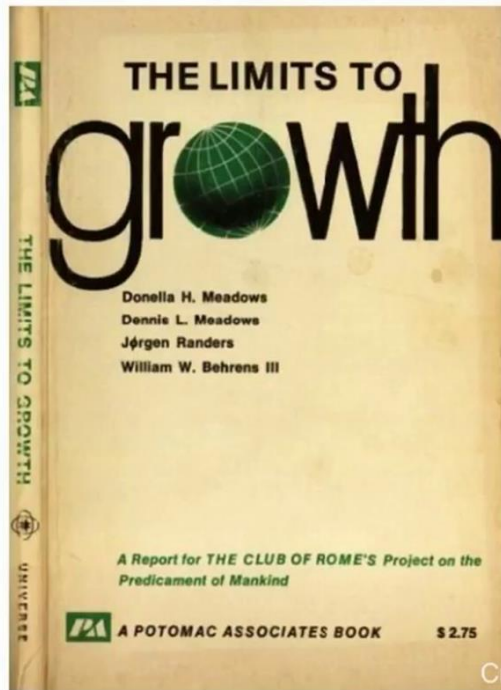
1789 μ.Χ.



σήμερα

3 εκ. χρόνια πριν

Πως σπάει η Μαλθουσιανή παγίδα_4



1. Meadows, D. H., Meadows, D. L., Randers, J., Behrens W.W. III. The Limits to Growth, A Report for the CLUB OF ROME'S Project of the predicament of Mankind, Universe Books, 1972. Available online <http://www.donellameadows.org/wp-content/userfiles/Limits-to-Growth-digital-scan-version.pdf> (accessed 5 June 2021)
2. Ehrlich, P. R. The population bomb, Sierra Club/Ballantine Books, New York, 1968.



Norman Borlaug «Πράσινη επανάσταση»

~1950



1789 μ.Χ.

1492 μ.Χ.

476 μ.Χ.

Έτος 1

3000 π.Χ.

10000 π.Χ.



3 εκ. χρόνια πριν

Πως σπάει η Μαλθουσιανή παγίδα_4

Population, 10,000 BCE to 2021



Source: HYDE (2017); Gapminder (2022); UN (2022)
Note: Historical country data is shown based on today's geographical borders.

OurWorldInData.org/world-population-growth • CC BY

Πηγή: <https://ourworldindata.org/grapher/population>

1961



σήμερα

1789 μ.Χ.

1492 μ.Χ.

476 μ.Χ.

Έτος 1

3000 π.Χ.

10000 π.Χ.

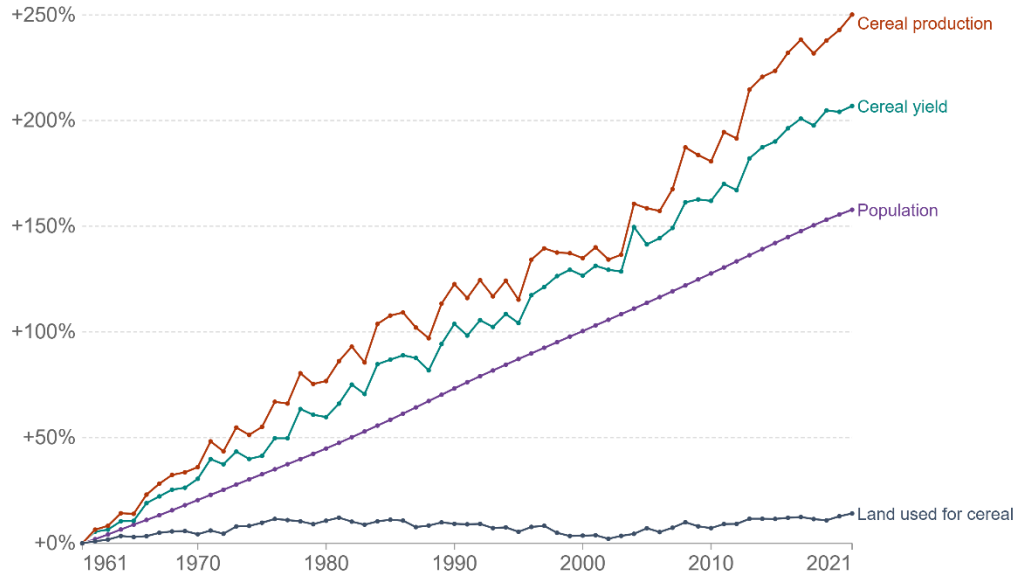
3 εκ. χρόνια πριν

Πως σπάει η Μαλθουσιανή παγίδα_4

Change in cereal production, yield, land use and population, World

All figures are indexed to the start year of the timeline. This means the first year of the time-series is given the value zero.

Our World
in Data



Source: Our World in Data based on World Bank; Food and Agriculture Organization of the United Nations
OurWorldInData.org/crop-yields • CC BY

Πηγές:

1. Food and Agriculture Organization of the United Nations
2. <https://ourworldindata.org/yields-vs-land-use-how-has-the-world-produced-enough-food-for-a-growing-population>

1961



10000 π.Χ.



3000 π.Χ.



Έτος 1

476 μ.Χ.



1492 μ.Χ.

1789 μ.Χ.



σήμερα

3 εκ. χρόνια πριν

Πρόσφατες ανατροπές της Μαλθουσιανής παγίδας



UNITED NATIONS CONFERENCE ON
ENVIRONMENT AND DEVELOPMENT

Rio de Janeiro 3-14 June 1992



1992 Διακήρυξη του ΟΗΕ στο Ρίο της Βραζιλίας «Η ανθρωπότητα βρίσκεται αντιμέτωπη με την διαιώνιση των ανισοτήτων, την επιδείνωση της φτώχειας, των ασθενειών και του αναλφαριθτισμού».

Πηγή: Earth Summit In Rio De Janeiro, Brazil On June 02, 1992 (Photo by Antonio RIBEIRO/Santoro Photo via Getty Images)



1992



Πρόσφατες ανατροπές της Μαλθουσιανής παγίδας

Population by income (%)

➕ Add a place

1992

33%

EXTREME POVERTY

\$/day

0.2 0.5 1 2 5 10 20 50 100 200 500

INCOME LEVEL 1 LEVEL 2 LEVEL 3 LEVEL 4 LEVEL 5

1992

Πηγή: <https://www.gapminder.org/fw/income-mountains/>

1992



σήμερα

1789 μ.Χ.

1492 μ.Χ.

476 μ.Χ.

Έτος 1

3000 π.Χ.

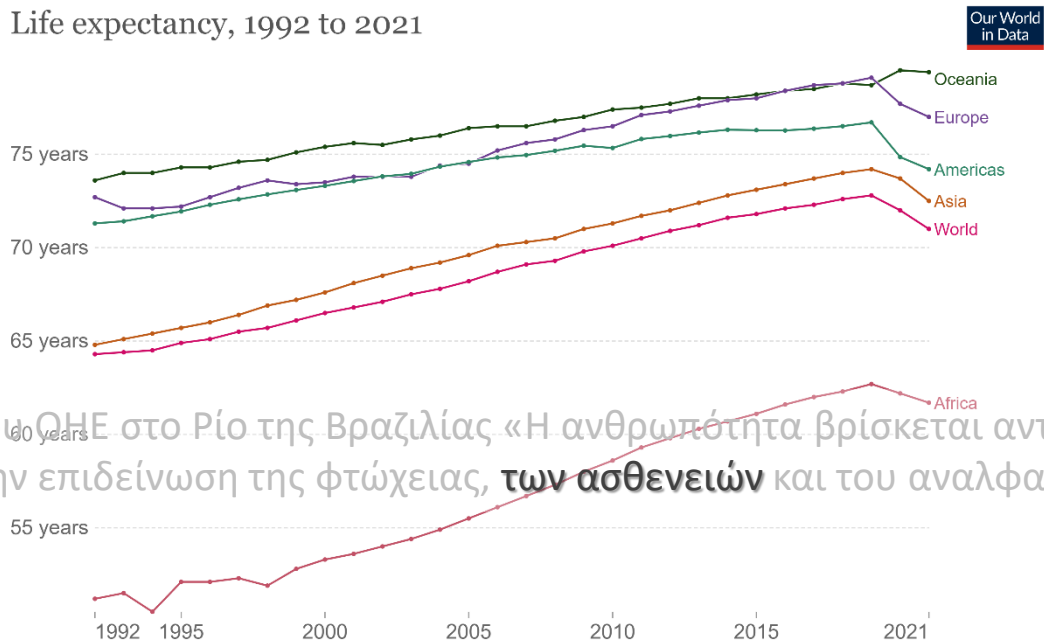
10000 π.Χ.

3 εκ. χρόνια πριν

1992 Διακήρυξη του ΟΗΕ στο Ρίο της Βραζιλίας «Η ανθρωπότητα βρίσκεται αντιμέτωπη με την διαίωνιση των ανισοτήτων, **την επιδείνωση της φτώχειας**, των ασθενειών και του αναλφαριθτισμού».

Πρόσφατες ανατροπές της Μαλθουσιανής παγίδας

Life expectancy, 1992 to 2021



Our World in Data

1992 Διακήρυξη του ΟΗΕ στο Ρίο της Βραζιλίας «Η ανθρωπότητα βρίσκεται αντιμέτωπη με την διαιώνιση των ανισοτήτων, την επιδείνωση της φτώχειας, των ασθενειών και του αναλφαβητισμού».

Πηγή: <https://ourworldindata.org/grapher/life-expectancy>

Source: UN WPP (2022); Zijdeman et al. (2015); Riley (2005)

Note: Shown is the 'period life expectancy'. This is the average number of years a newborn would live if age-specific mortality rates in the current year were to stay the same throughout its life.

OurWorldInData.org/life-expectancy • CC BY

1992



10000 π.Χ.

3000 π.Χ.

Έτος 1

476 μ.Χ.

1492 μ.Χ.

1789 μ.Χ.

σήμερα

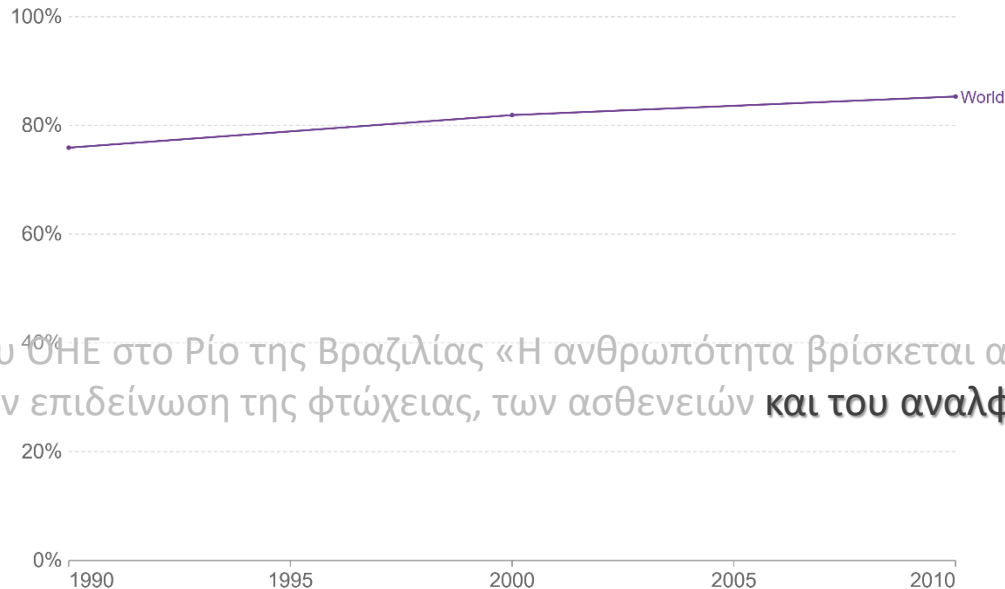
3 εκ. χρόνια πριν

Πρόσφατες ανατροπές της Μαλθουσιανής παγίδας

Literacy rate, 1990 to 2010

Estimates correspond to the share of the population older than 14 years that is able to read and write.

Our World
in Data



1992 Διακήρυξη του ΟΗΕ στο Ρίο της Βραζιλίας «Η ανθρωπότητα βρίσκεται αντιμέτωπη με την διαιώνιση των ανισοτήτων, την επιδείνωση της φτώχειας, των ασθενειών και του αναλφαβητισμού».

Πηγή: <https://ourworldindata.org/grapher/cross-country-literacy-rates>

1992



Source: WDI, CIA World Factbook, & other sources

OurWorldInData.org/literacy • CC BY

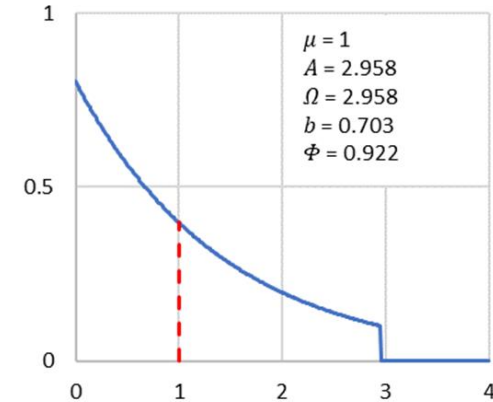
Note: Specific definitions and measurement methodologies vary across countries and time. See the 'Sources'-tab for more details.



Τα αίτια των ανατροπών



Entropy maximizing probability density function

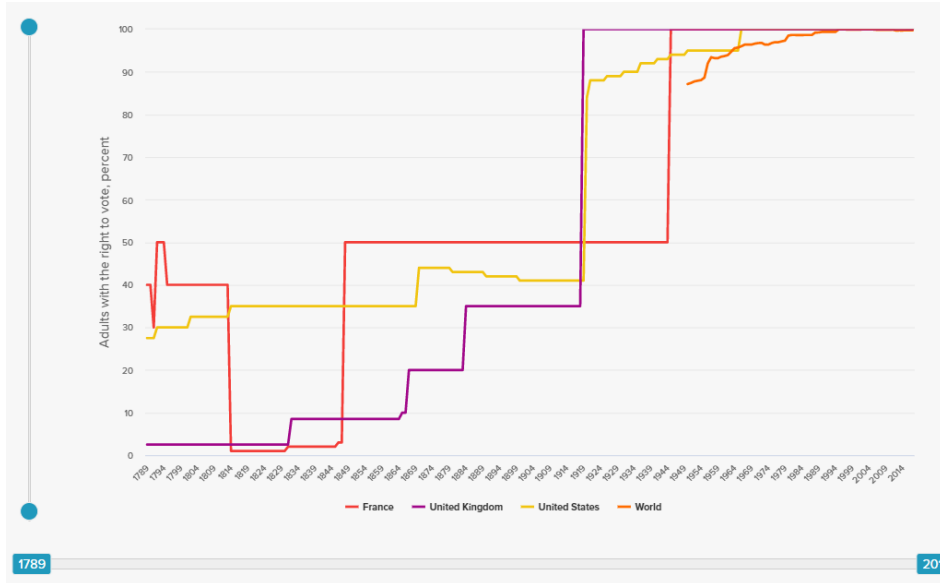


Πηγή: Koutsoyiannis, D.; Sargentis, G.-F. Entropy and Wealth. Entropy 2021, 23, 1356. <https://doi.org/10.3390/e23101356>

1789



Τα αίτια των ανατροπών



Adults with the right to vote; percent, 1789–2017

Πηγή:

<https://www.humanprogress.org/dataset/adults-with-the-right-to-vote>

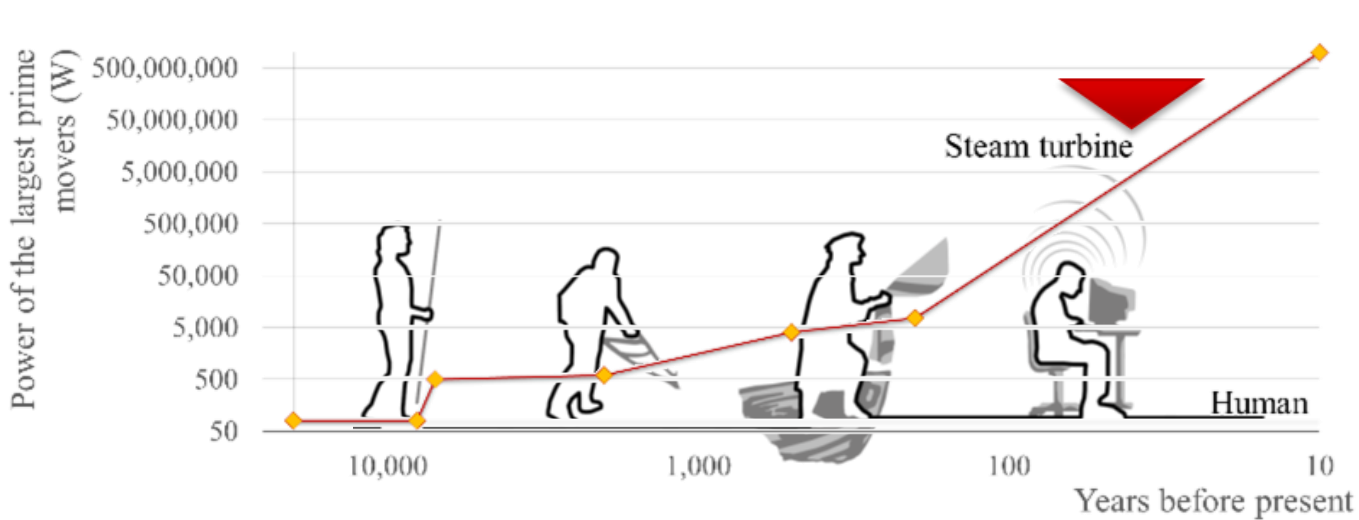
1789



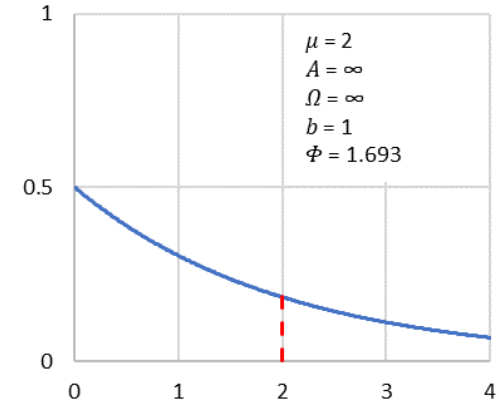
1789 μ.Χ.



Τα αίτια των ανατροπών



Entropy maximizing probability density function



Πηγή: Koutsoyiannis, D.; Sargentis, G.-F. Entropy and Wealth. Entropy 2021, 23, 1356. <https://doi.org/10.3390/e23101356>

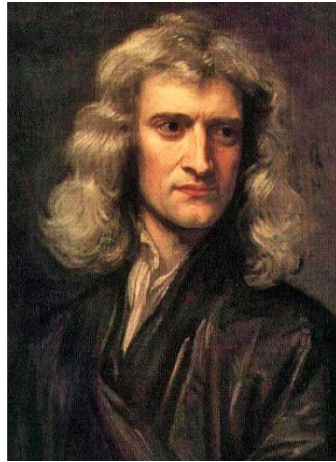
1789



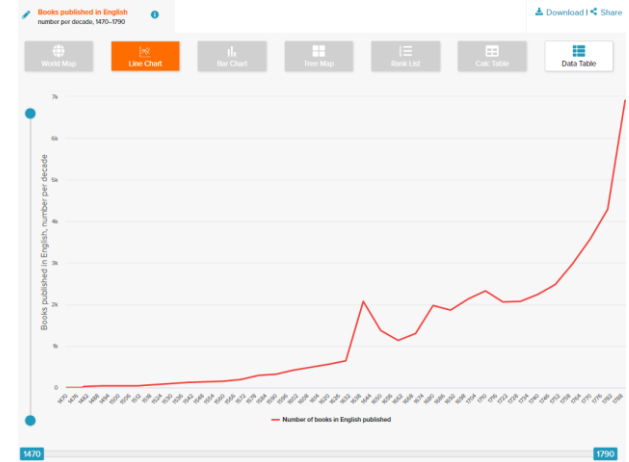
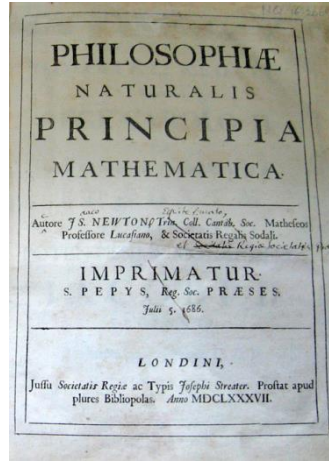
Τα αίτια των ανατροπών



Galileo di Vincenzo Bonaiuti de' Galilei,
1564–1642



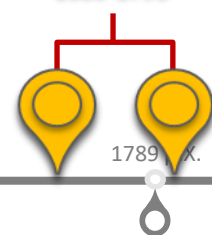
Sir Isaac Newton, 1642–1726



Books published in English
number per decade, 1470–1790

Πηγή: <https://www.humanprogress.org/dataset/books-published-in-english/>

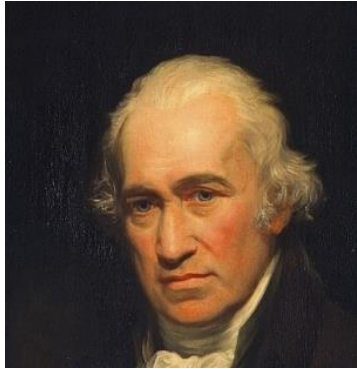
Επιστημονική
επανάσταση
1600-1790



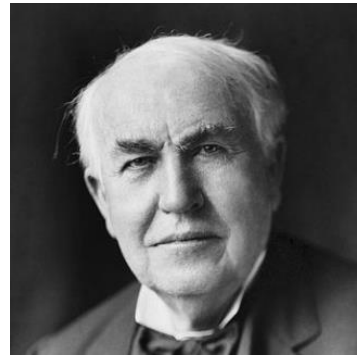
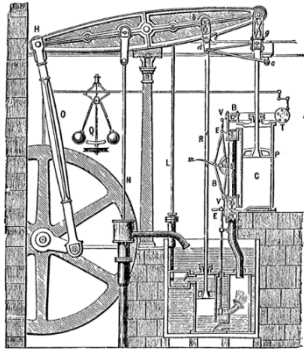
Κιλό και μέτρο, 1791
Le musée des Arts et Métiers



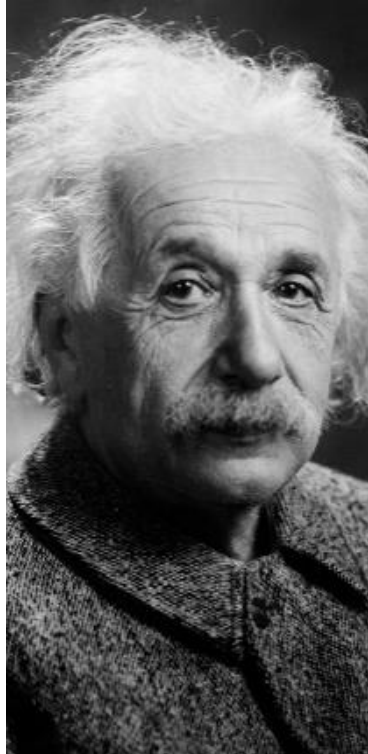
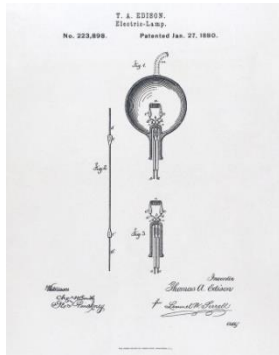
Τα αίτια των ανατροπών



James Watt. 1736–1819



Thomas Alva Edison 1847–1931

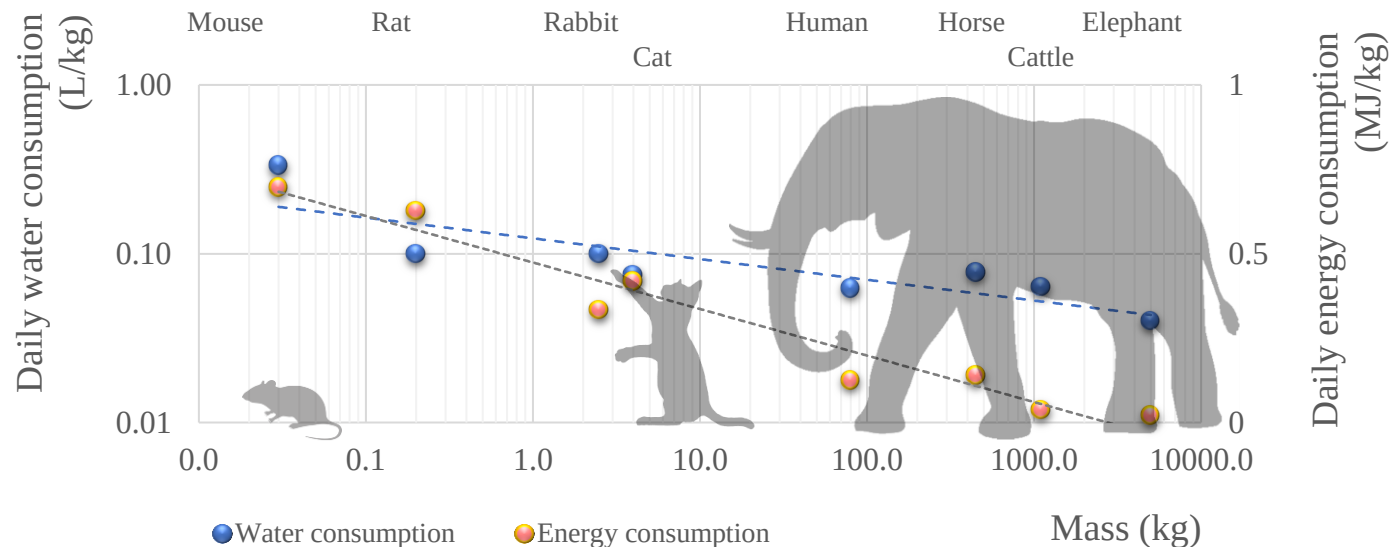


Albert Einstein, 1879–1955



Τα αίτια των ανατροπών

Οικονομίες κλίμακας: ο ρόλος τους στην Φύση

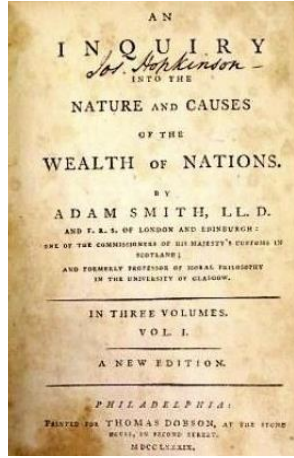
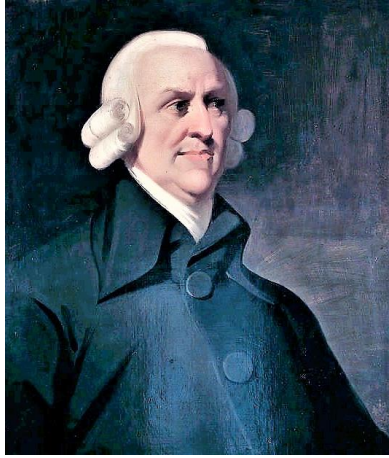


Κατανάλωση νερού και ενέργειας των θηλαστικών ανά μονάδα μάζας

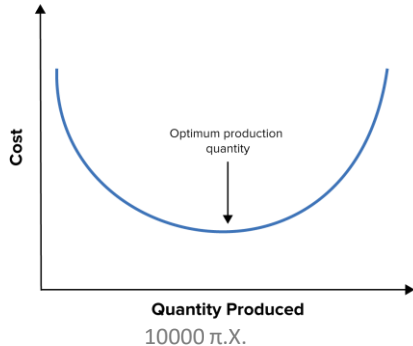
Πηγή: Sargentis, G.F.; Lagaros, N.D.; Cascella, G.L.; Koutsoyiannis, D. Threats in Water–Energy–Food–Land Nexus by the 2022 Military and Economic Conflict. Land 2022, 11, 1569. <https://doi.org/10.3390/land11091569>



Τα αίτια των ανατροπών



Smith, A. The Wealth of Nations, W. Strahan and T. Cadell, London 1776.



1776

1781 μ.Χ.

1492 μ.Χ.

476 μ.Χ.

Έτος 1

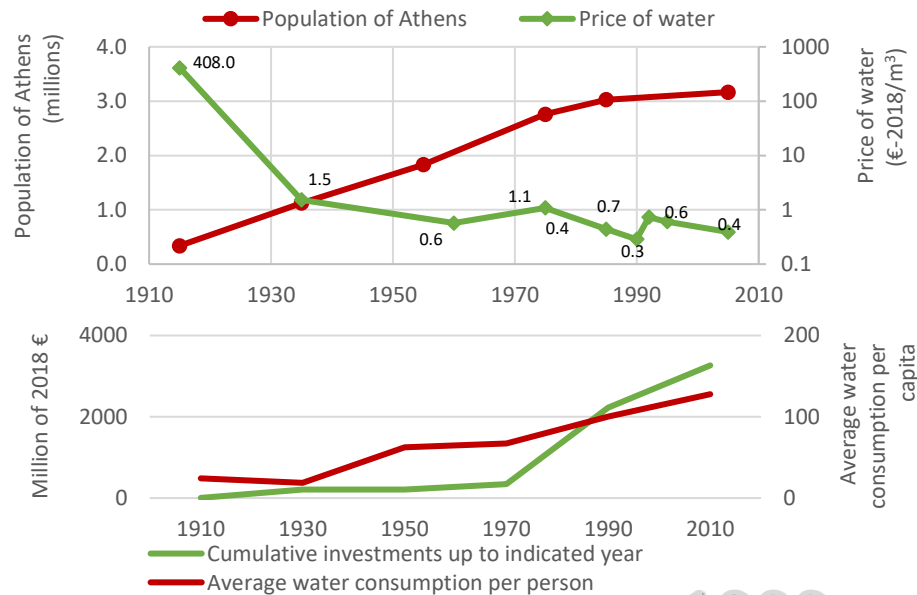
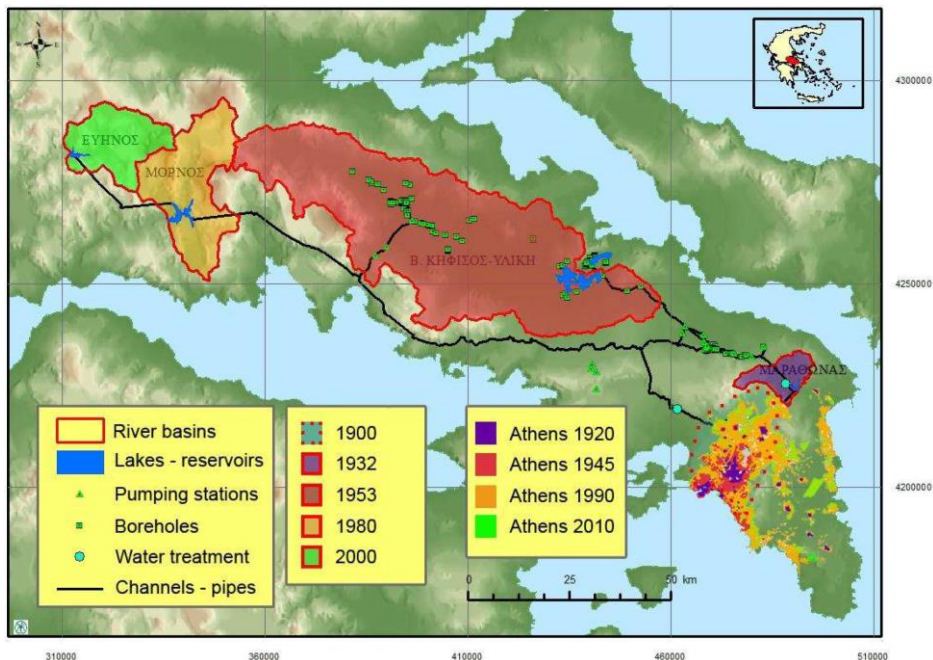
3000 π.Χ.

10000 π.Χ.

3 εκ. χρόνια πριν

σήμερα

Τα αίτια των ανατροπών



Πηγή: Sargentis, G.-F.; Ioannidis, R.; Karakatsanis, G.; Sigourou, S.; Lagaros, N.D.; Koutsoyiannis, D. The Development of the Athens Water Supply System and Inferences for Optimizing the Scale of Water Infrastructures. Sustainability 2019, 11, 2657. <https://doi.org/10.3390/su11092657>

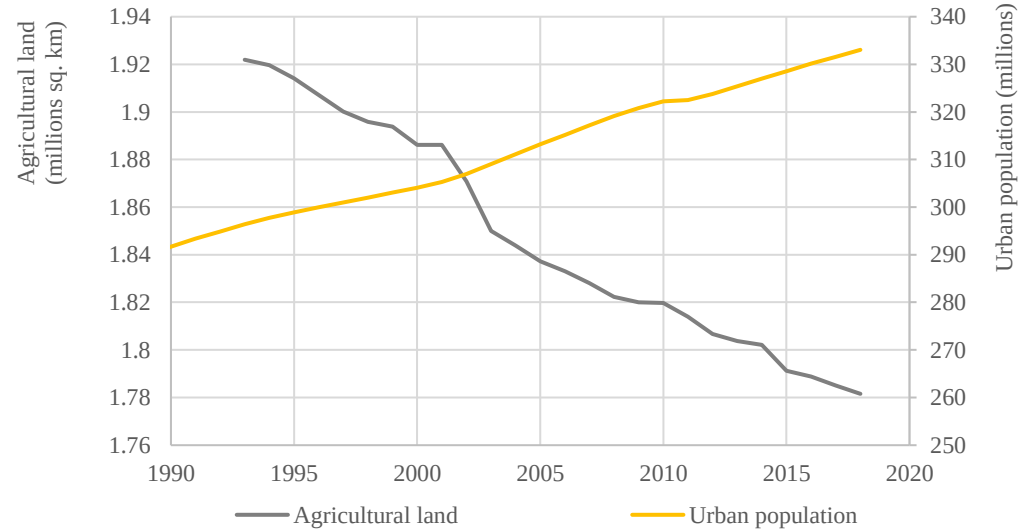
~1900



Τα αίτια των ανατροπών



Πηγή: Sargentis, G.F.; Lagaros, N.D.; Cascella, G.L.; Koutsoyiannis, D. Threats in Water–Energy–Food–Land Nexus by the 2022 Military and Economic Conflict. Land 2022, 11, 1569. <https://doi.org/10.3390/land11091569>



Ευρώπη: Αγροτική γη και αστικοποίηση

Ευρώπη: Νυχτερινές δορυφορικές φωτογραφίες

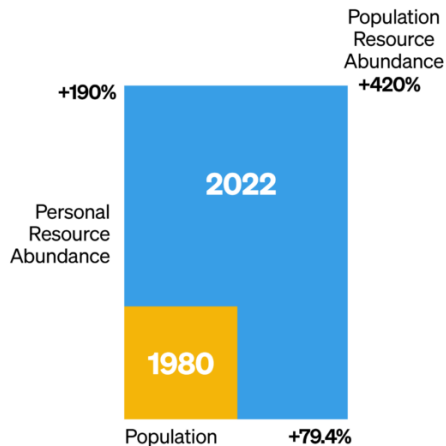
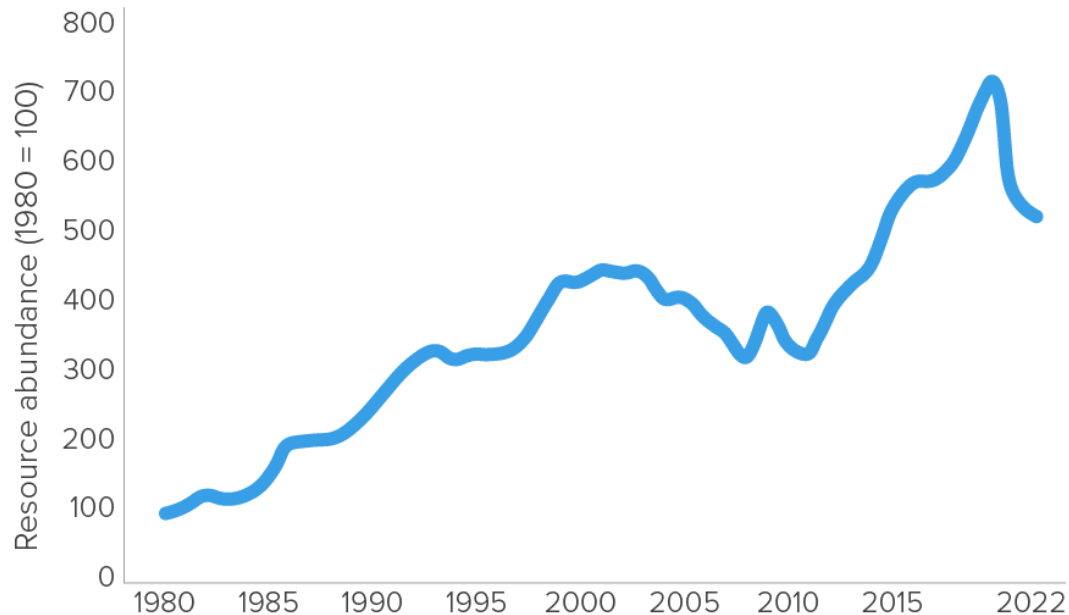
Πηγή: National Oceanic and Atmospheric Administration. National Centers for Environmental Information. Version 4 DMSP-OLS Nighttime Light Time Series.

Available online: <https://ngdc.noaa.gov/eog/dmsp/downloadV4composites.html>



Τα αίτια των ανατροπών

Πηγή: <https://www.humanprogress.org/the-simon-abundance-index-2023/>



Basic 50

GDP per Total Hours Worked

Compound Annual Growth Rate - Population Resource Abundance: **4.0%**

Years to Double - Population Resource Abundance: **17.65**

Personal Resource Abundance Elasticity of Population: **2.39**

Population Resource Abundance Elasticity of Population: **5.29**

1980



σήμερα



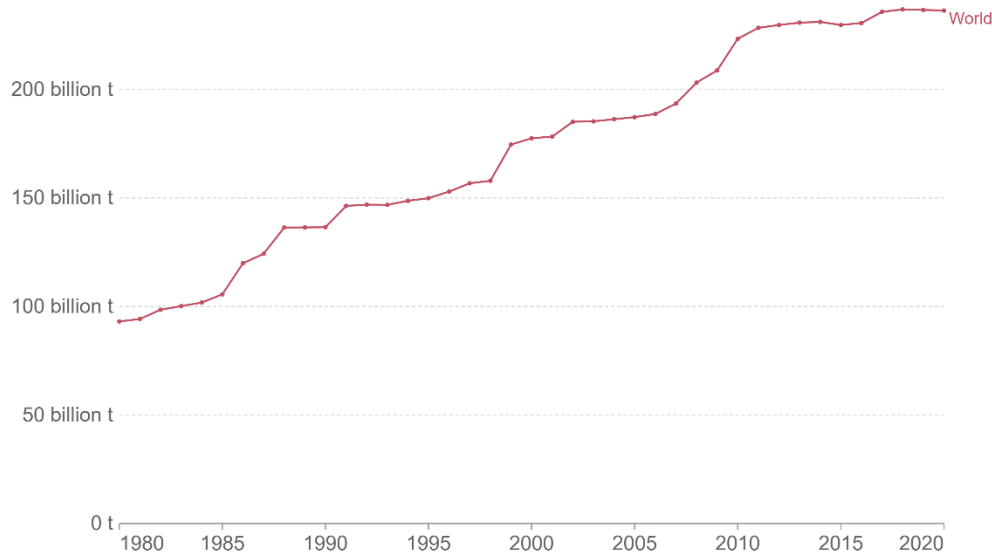
Τα αίτια των ανατροπών

Πηγή: <https://ourworldindata.org/grapher/oil-proved-reserves?tab=chart&time=earliest...2020/>

Oil reserves, 1980 to 2020

Shown is the total proven reserves of oil. This is oil that we know with reasonable certainty can be recovered in the future under existing economic and operating conditions. Proven reserves decrease when we extract oil, and increase as new resources are discovered or become economically viable to extract.

Our World
in Data



Source: Statistical Review of World Energy - BP (2022)

OurWorldInData.org/energy • CC BY

1980



σήμερα

1789 μ.Χ.

1492 μ.Χ.

476 μ.Χ.

Έτος 1

3000 π.Χ.

10000 π.Χ.

3 εκ. χρόνια πριν

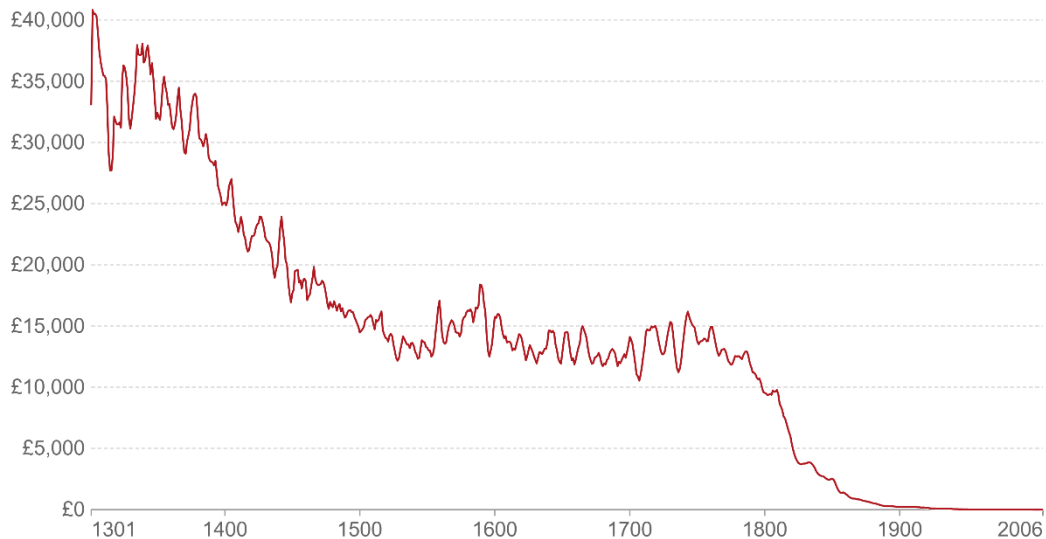
Τα αίτια των ανατροπών

Πηγή: <https://ourworldindata.org/grapher/the-price-for-lighting-per-million-lumen-hours-in-the-uk-in-british-pound>

The price for lighting in the United Kingdom

Our World
in Data

The price per million lumen-hours in British Pound. 1 lumen-hour is equal to the luminous energy emitted in 1 hour by a light source emitting a luminous flux of 1 lumen. For comparison: a standard 100W incandescent light bulb emits around 1700 lumen.



Source: Fouquet and Pearson (2012)

OurWorldInData.org/light-at-night • CC BY

Note: The price is adjusted for inflation and expressed in prices for the year 2000. Shown is a 5-year moving average.

1980



10000 π.Χ.



3000 π.Χ.

Έτος 1

476 μ.Χ.



1492 μ.Χ.



1789 μ.Χ.



σήμερα



3 εκ. χρόνια πριν



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Japan

This article is more than 10 years old

Let elderly people 'hurry up and die', says Japanese minister

Taro Aso says he would refuse end-of-life care and would 'feel bad' knowing treatment was paid for by government

Πηγή:
<https://www.theguardian.com/world/2013/jan/22/elderly-hurry-up-die-japanese>

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Politicians who consider sacrificing the old for the sake of the economy face a backlash: Don Pittis

If we start trading the lives of older people for the economy, when will it stop?



Don Pittis · CBC News · Posted: Mar 26, 2020 4:00 AM EDT | Last Updated: March 26, 2020

Πηγή:
<https://www.cbc.ca/news/business/coronavirus-covid-economy-seniors-1.5510079>



NEW YORK POST

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NEWS

Yale professor under fire for suggesting elderly Japanese residents should kill themselves

By Yaron Steinbuch

February 13, 2023 | 12:49pm | Updated

Πηγή:
<https://nypost.com/2023/02/13/yale-professor-suggests-elderly-japanese-residents-should-die-in-mass-suicide/>

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Population growth, environmental degradation and climate change

Πηγή:
<https://www.un.org/en/desa/population-growth-environmental-degradation-and-climate-change>



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World is on a 'path to disaster' if radical changes aren't made to ensure green growth, report argues

Holly Bancroft | 4 days ago | 72 comments

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Πηγή: <https://www.independent.co.uk/climate-change/news/fsa-population-decline-climate-change-b1934877.html>

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Πηγή: <https://www.dyingwithdignity.ca/>

The New York Times

Dutch Law Would Allow Assisted Suicide for Healthy Older People

📖 🌐 📌

By Dan Bilefsky and Christopher F. Schuetz
Oct. 13, 2016

Πηγή: <https://www.nytimes.com/2016/10/14/world/europe/dutch-law-would-allow-euthanasia-for-healthy-elderly-people.html>



Πηγή: <https://www.humanprogress.org/how-anti-humanism-is-gaining-ground/>

