cca Centro de Ciencias Ambientales
Facultad de Ciencias · Universidad de Chile

POBLACION HUMANA Y MEDIOAMBIENTE

Dr. Manuel Leiva Guzmán

Conceptos claves a revisar

- **¿Cuál es la población actual? ¿Cuál será en 2050?**
- **¿Qué factores afectan las tasas de crecimiento de la población?**
- **¿Cómo se compara la tasa de crecimiento en los países desarrollados y los países en desarrollo?**
- **¿Qué es una "transición demográfica? ¿Cuáles son sus etapas?**
- **¿Por qué el crecimiento de la población es tan importante para los problemas ambientales?**

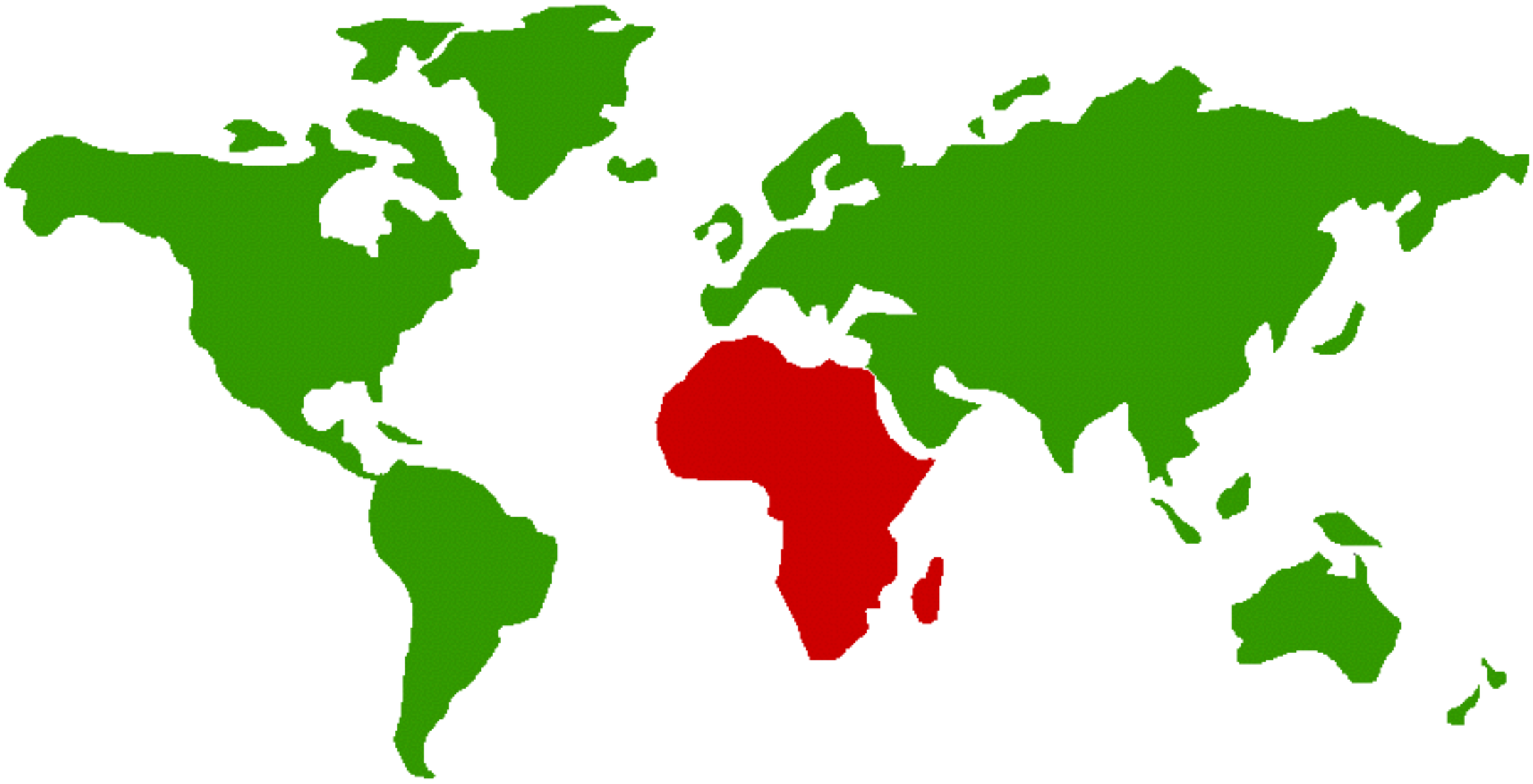
Población humana

(latín tardío populatio, en latín 'saqueo', 'devastación')

En geografía y sociología
grupo de personas que viven en un
área o espacio geográfico.

Población biológica
es el conjunto de individuos de la misma
especie que habita una extensión
determinada en un momento dado.

Hace un millón de años...



Hace un millón de años...
durante el paleolítico inferior, se calcula que el mundo tenía 125.000 habitantes humanos. Todos en Africa.

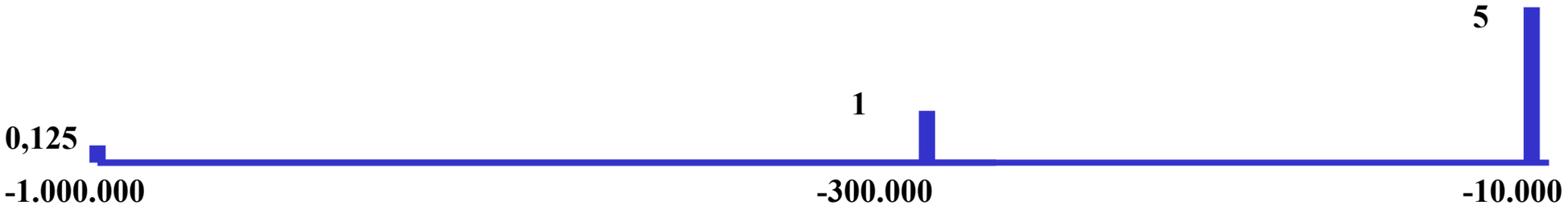
0,125

-1.000.000

Hace trescientos mil años...
Durante el paleolítico medio, se calcula que el mundo tenía un millón de habitantes humanos. Ya ocupaban Eurasia.

Hace diez mil años...

Poco antes de comenzar el neolítico, se calcula que el mundo tenía cinco millones de habitantes humanos. Ya ocupaban todo el mundo.



World Population

Projected world population until 2100

1990 5.3 billion

2015 7.3 billion

2030 8.5 billion

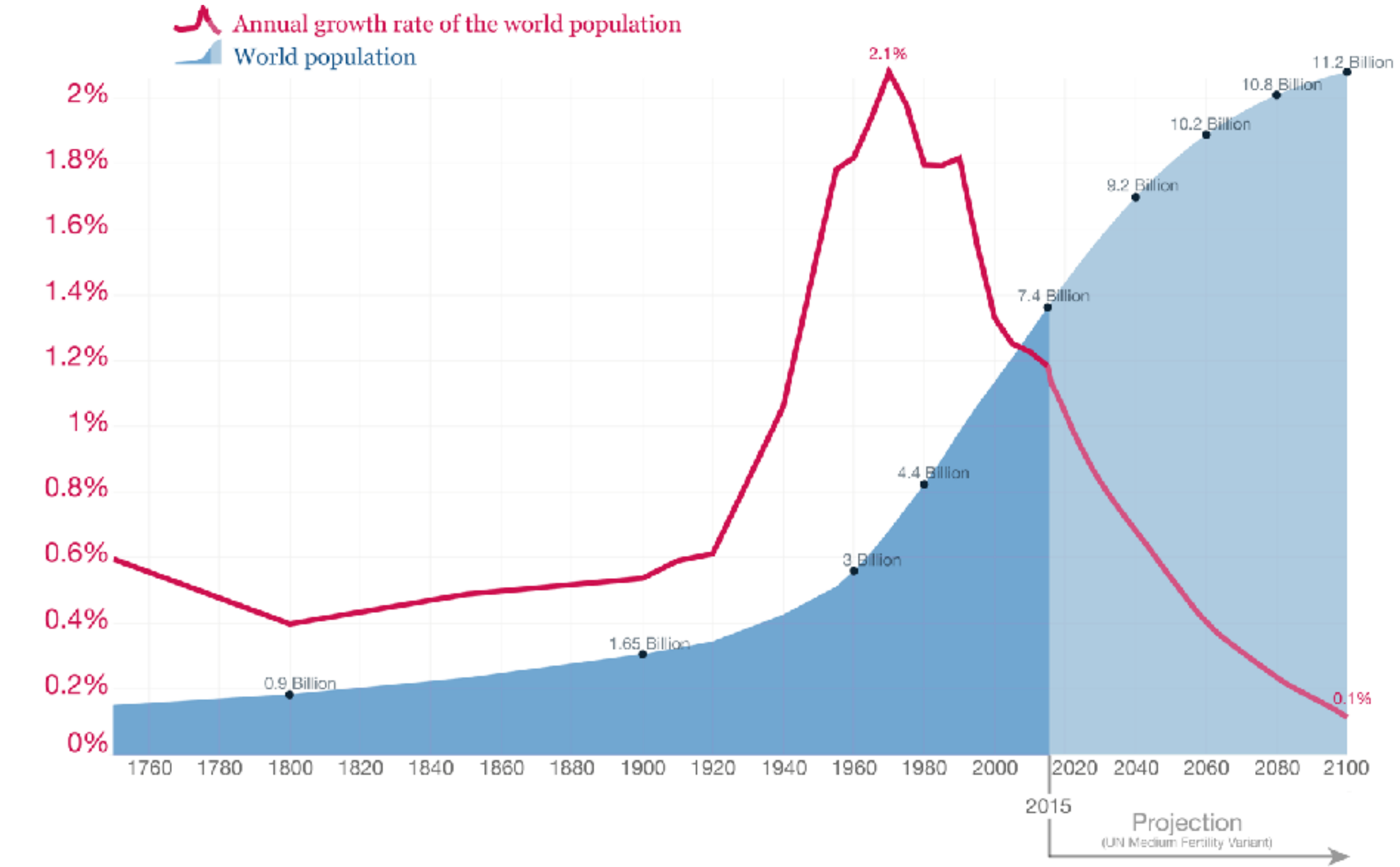
2050 9.7 billion

2100 11.2 billion

Source: United Nations Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2015 Revision*
Produced by: United Nations Department of Public Information

2015 TIME FOR GLOBAL ACTION

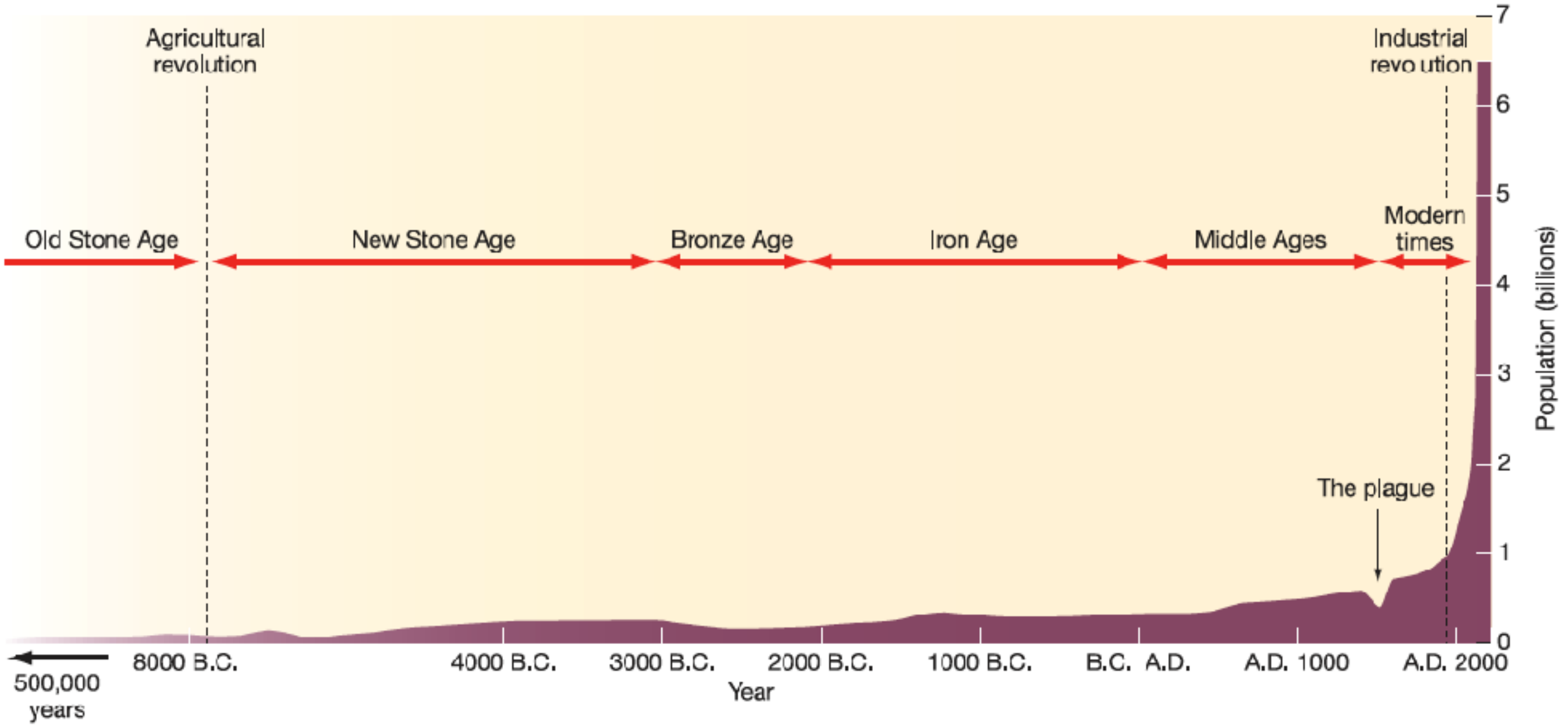
SERIE DE TIEMPO DEL CRECIMIENTO DE LA POBLACIÓN



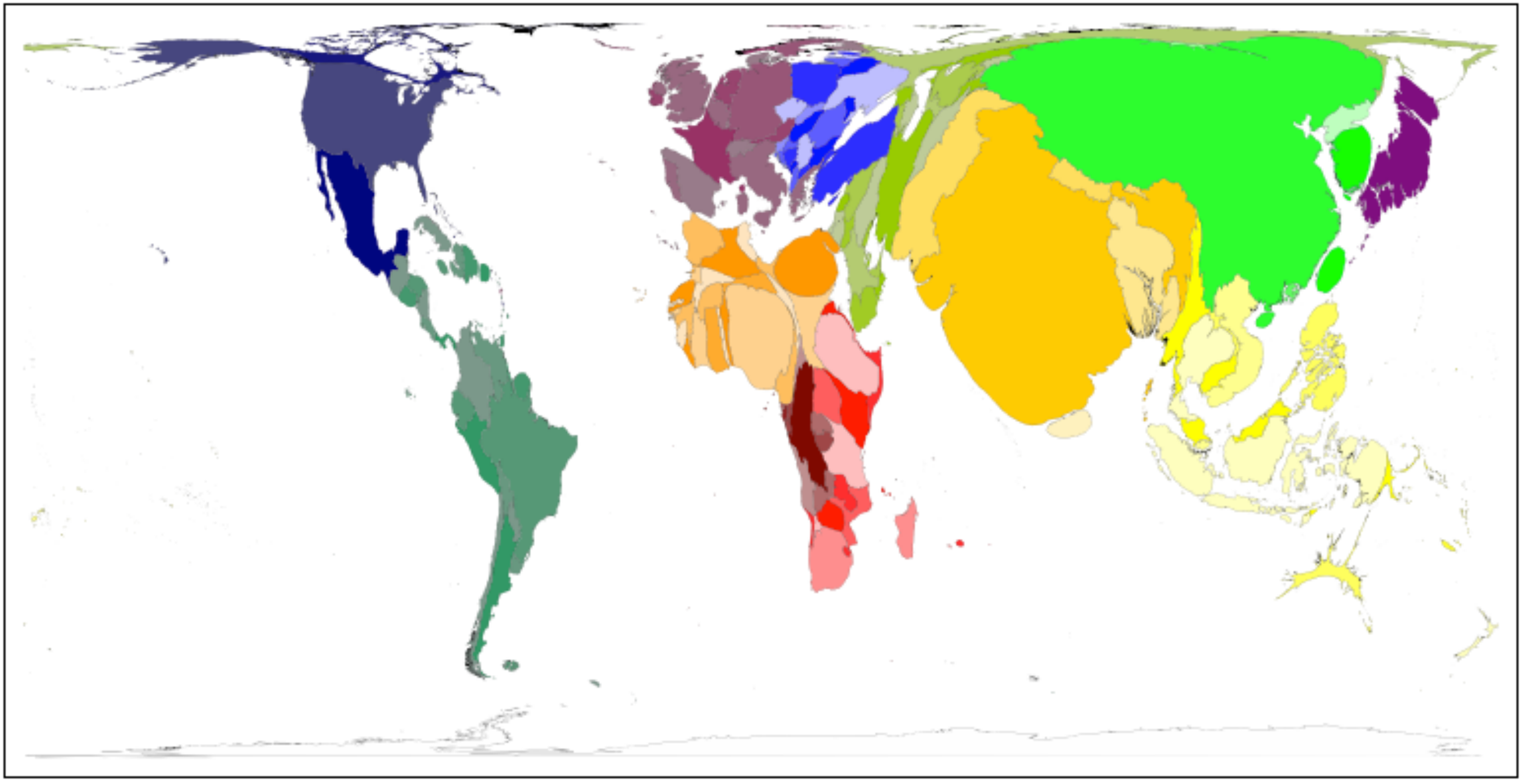
Data sources: Up to 2015 OurWorldInData series based on UN and HYDE. Projections for 2015 to 2100: UN Population Division (2015) – Medium Variant.
The data visualization is taken from OurWorldInData.org. There you find the raw data and more visualizations on this topic.

AMERICAN MUSEUM OF NATURAL HISTORY

SERIE DE TIEMPO DEL CRECIMIENTO DE LA POBLACIÓN



POBLACIÓN MUNDIAL



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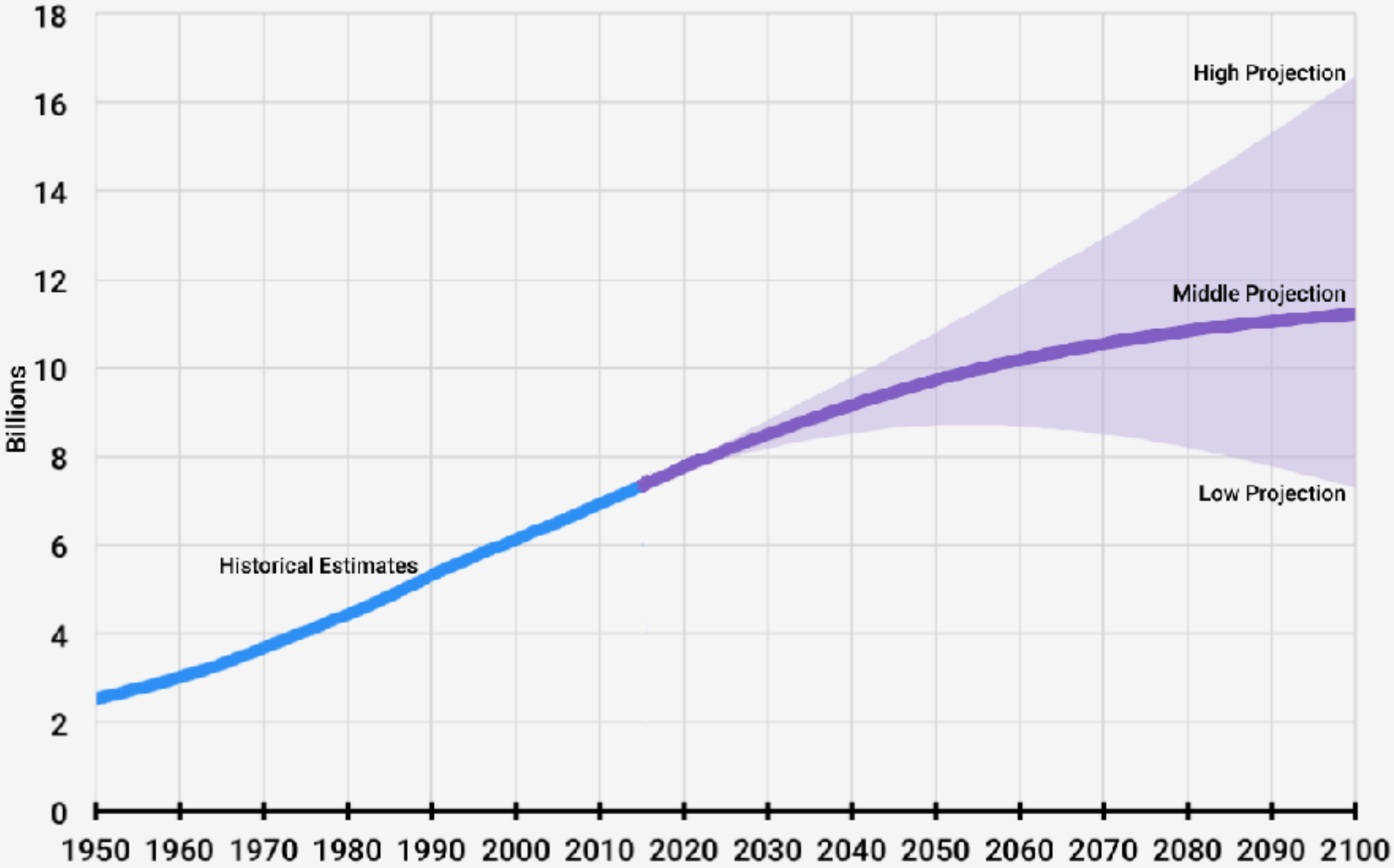

SOURCE: United Nations, "World Population Prospects: 2015 Revision"

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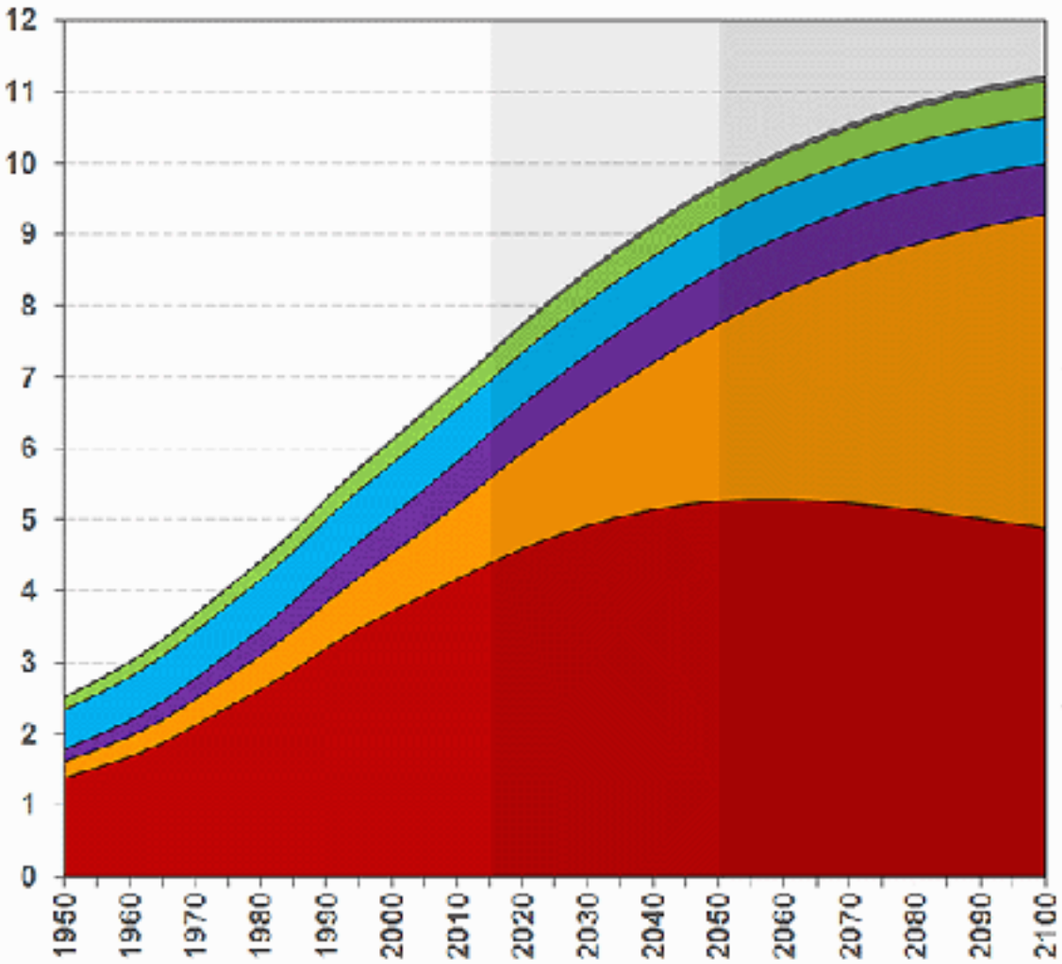
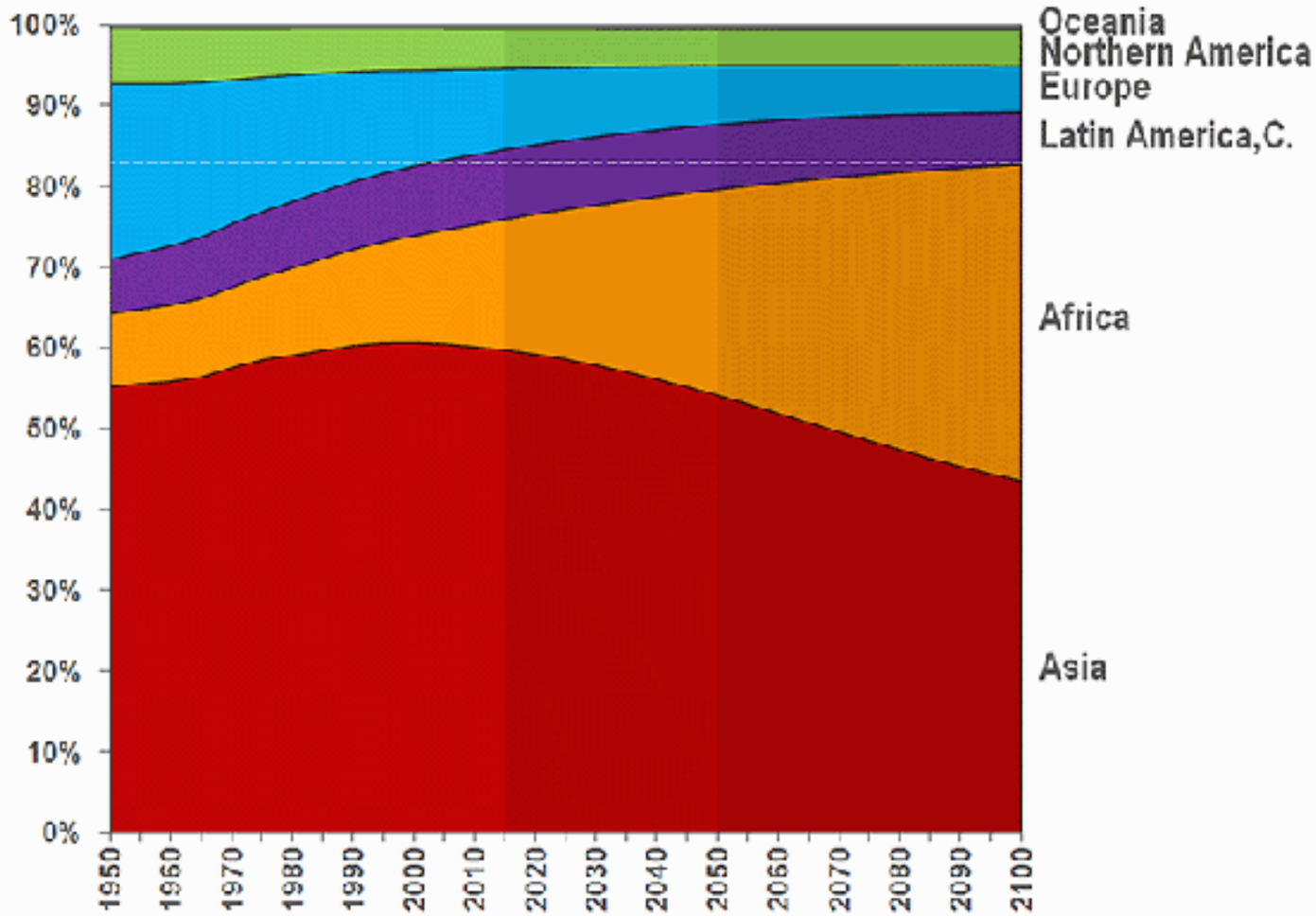
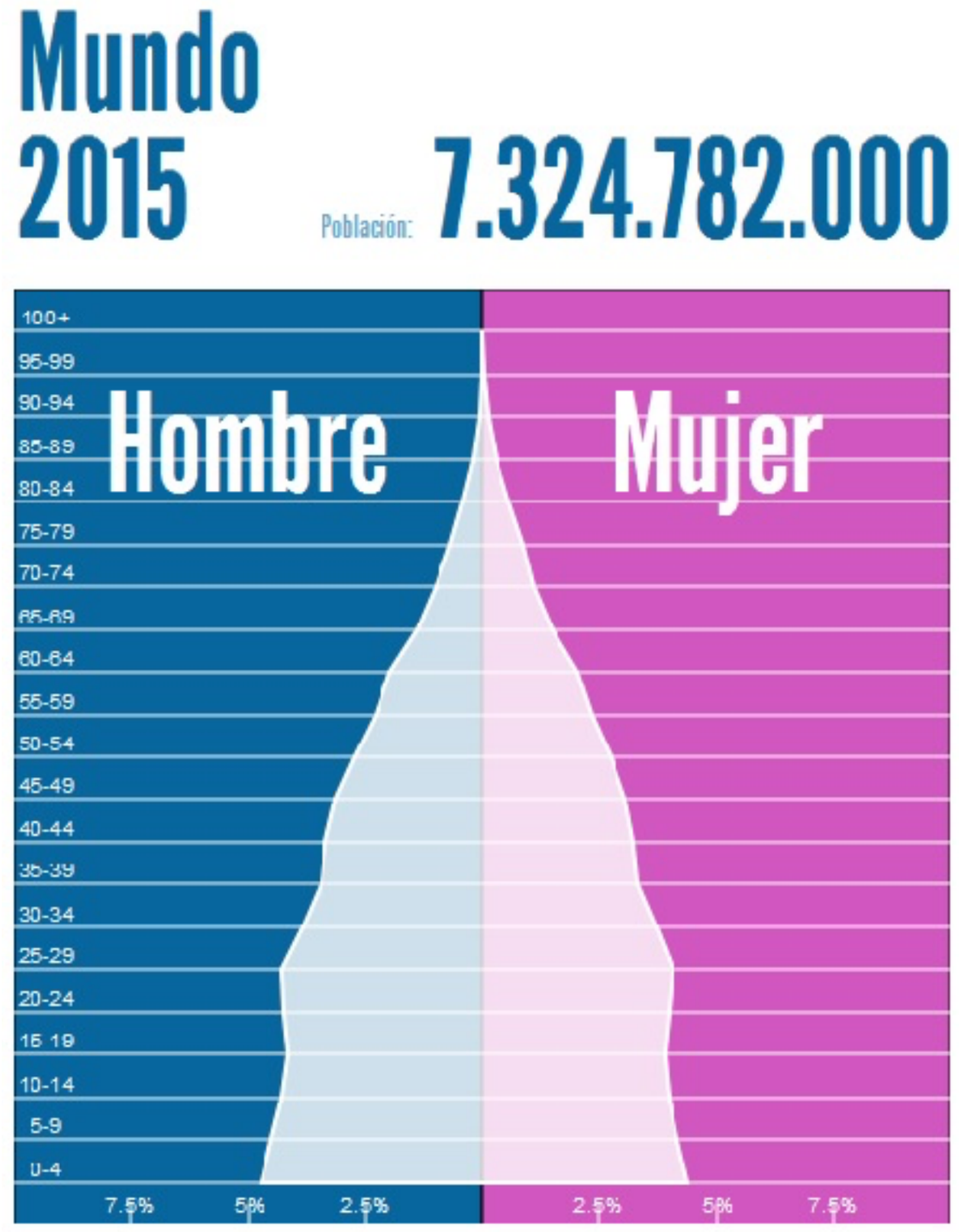




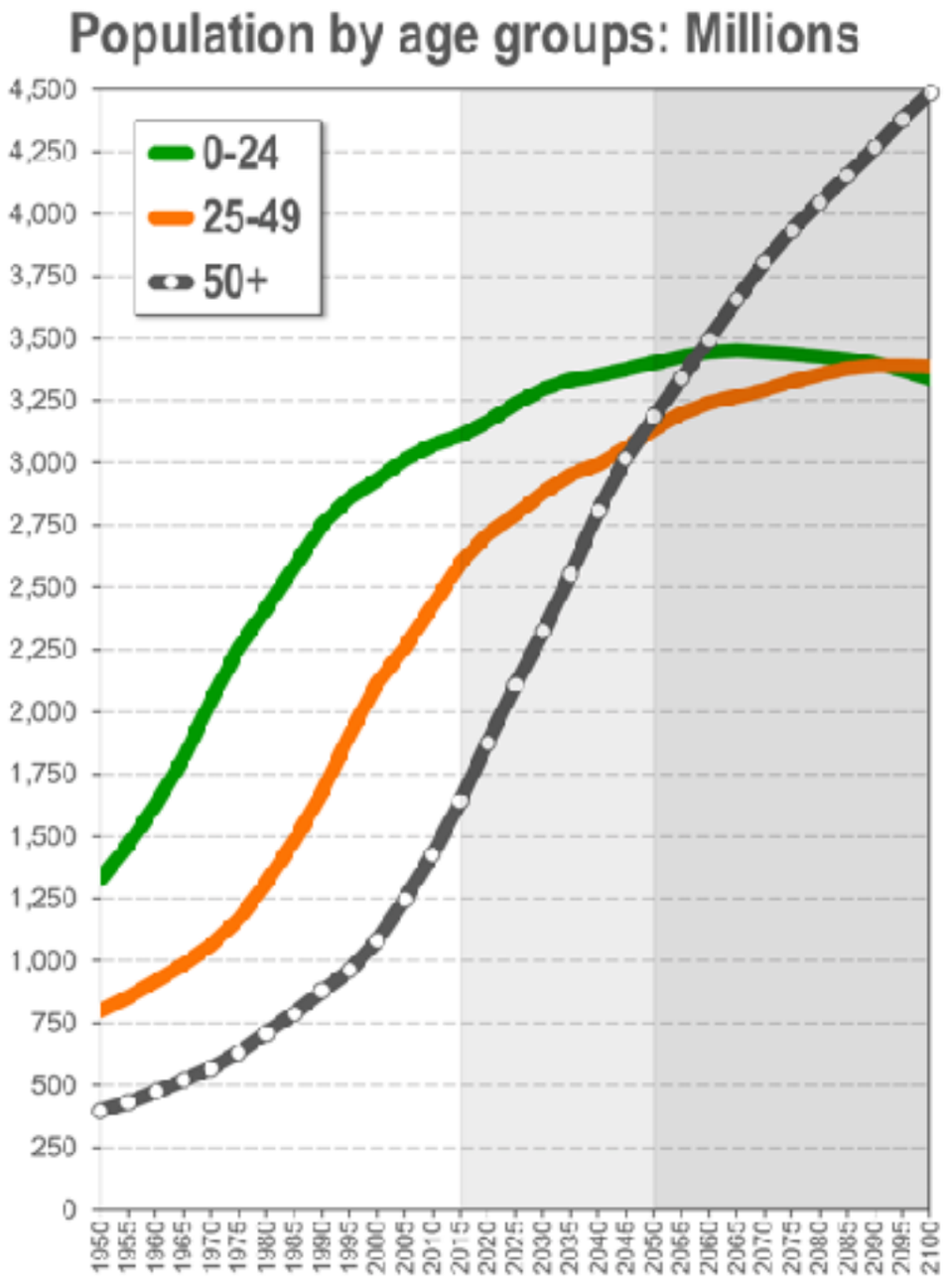
http://www.demographics.at

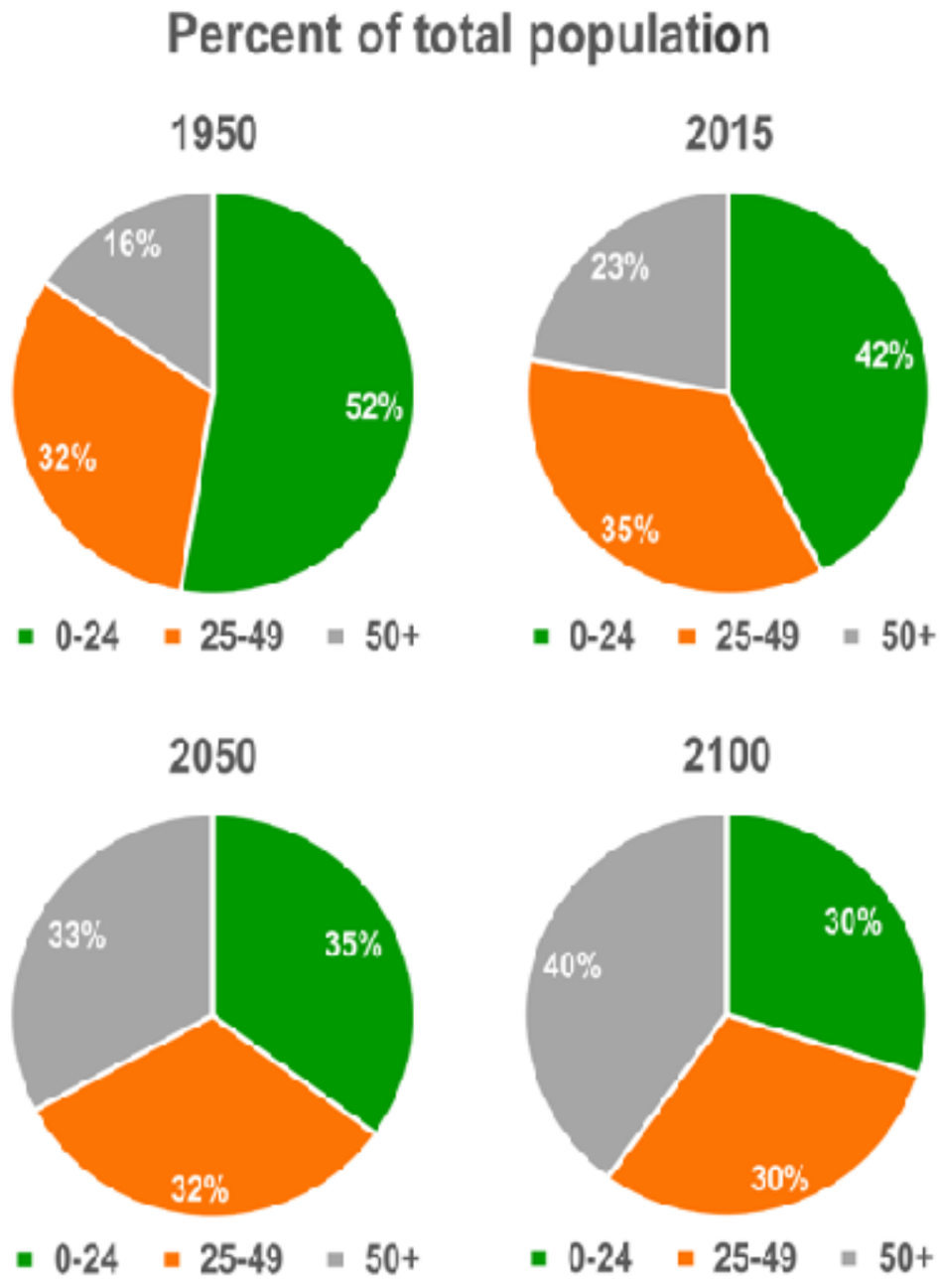
POBLACIÓN MUNDIAL



Enlace a este gráfico: http://populationpyramid.net/es/mundo/2015/

POBLACIÓN MUNDIAL





http://www.demographics.at

¿Que factores entonces afectan el crecimiento de la población humano?

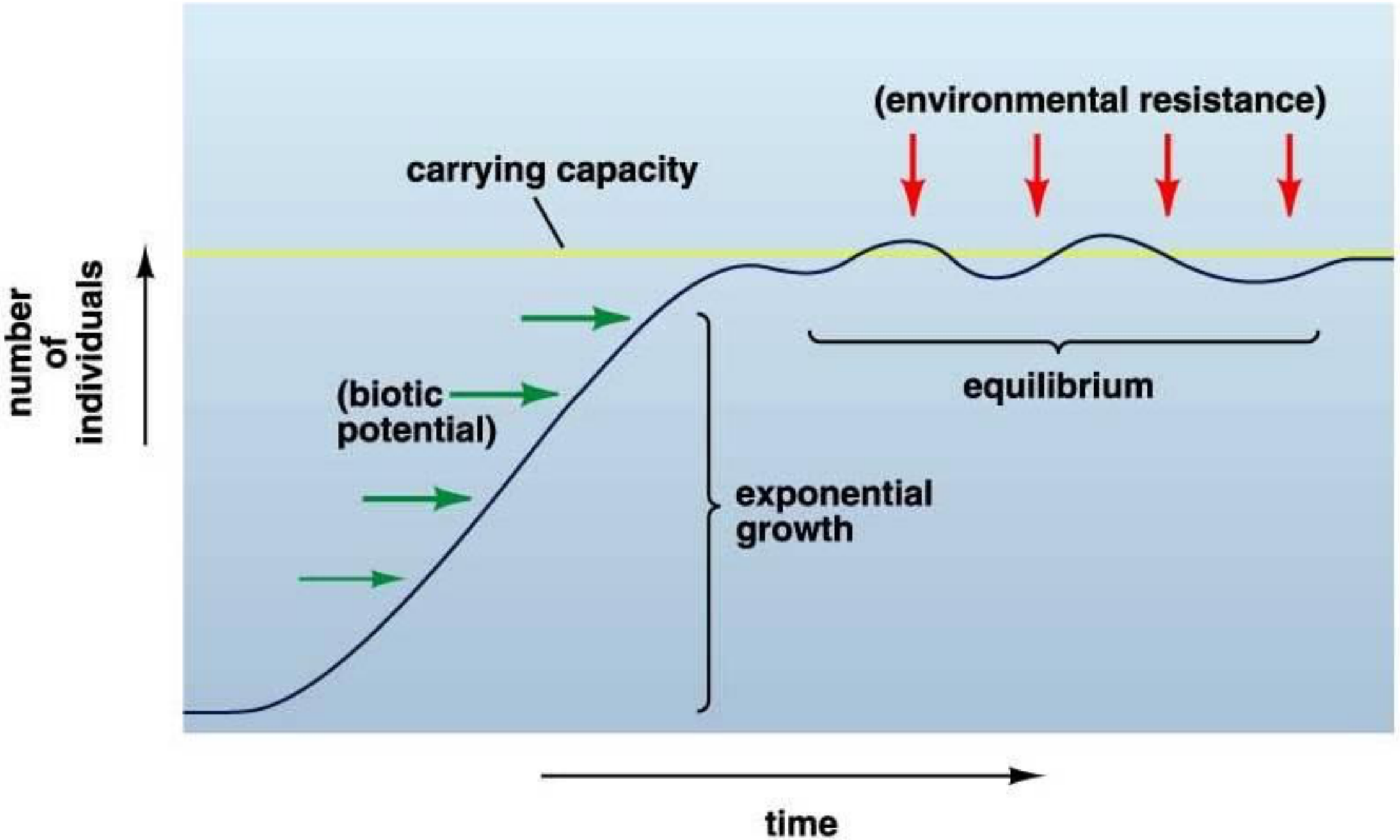
CRECIMIENTO POBLACIONAL Y LA RESISTENCIA AMBIENTAL

Los organismos vivos **no pueden** reproducirse al ritmo máximo de su potencial biótico, puesto que ciertos **factores ambientales actuarán como limitantes**, como por ejemplo, alimento, espacio, enemigos, enfermedades, competidores y limitantes climáticas.

CRECIMIENTO POBLACIONAL Y LA RESISTENCIA AMBIENTAL

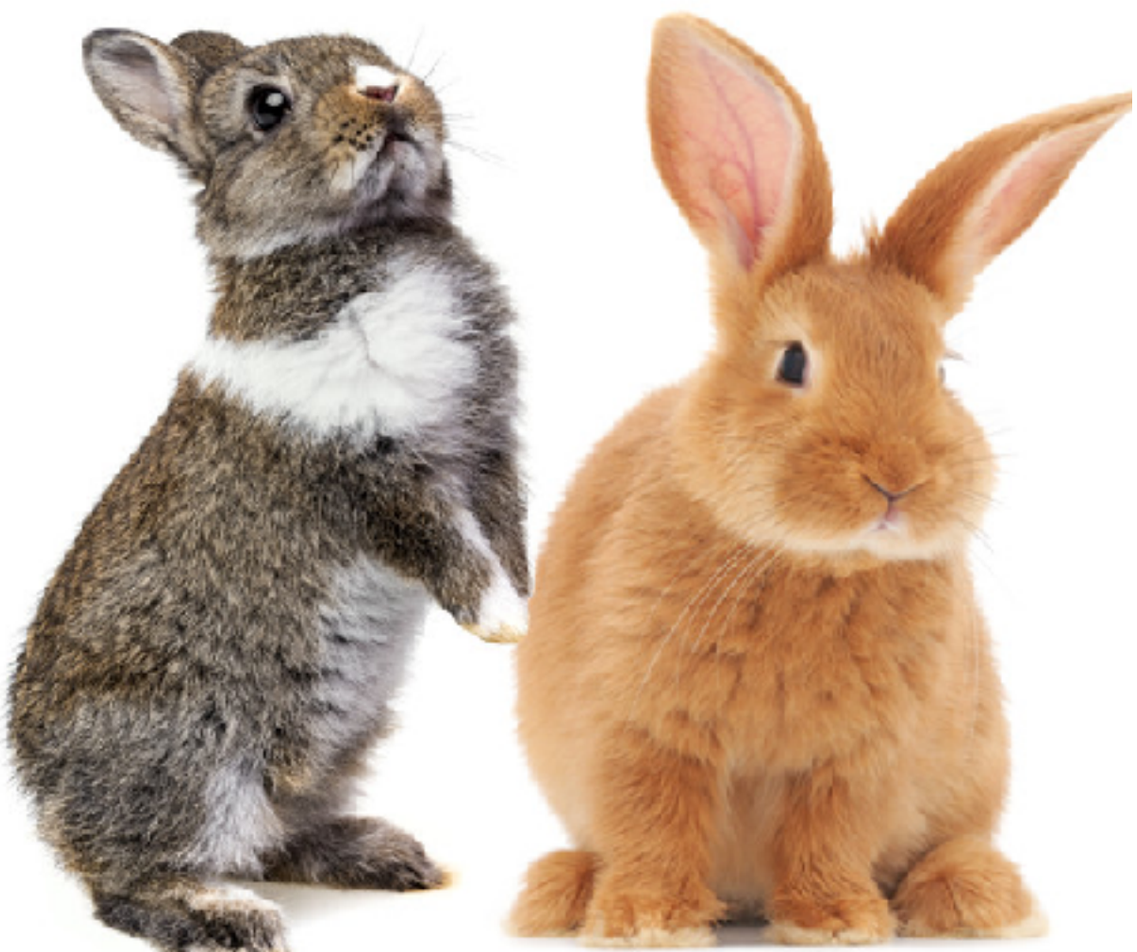
Al conjunto de **factores ambientales actuarán como limitantes o que actúan como una fuerza en contra del potencial biótico, se le denomina *resistencia ambiental*.**

CRECIMIENTO POBLACIONAL Y LA RESISTENCIA AMBIENTAL



El modelo de "transición demográfica"

El aumento sin precedentes de la población mundial no ocurrió porque estábamos criando como conejos, sino porque ya no morimos como moscas.



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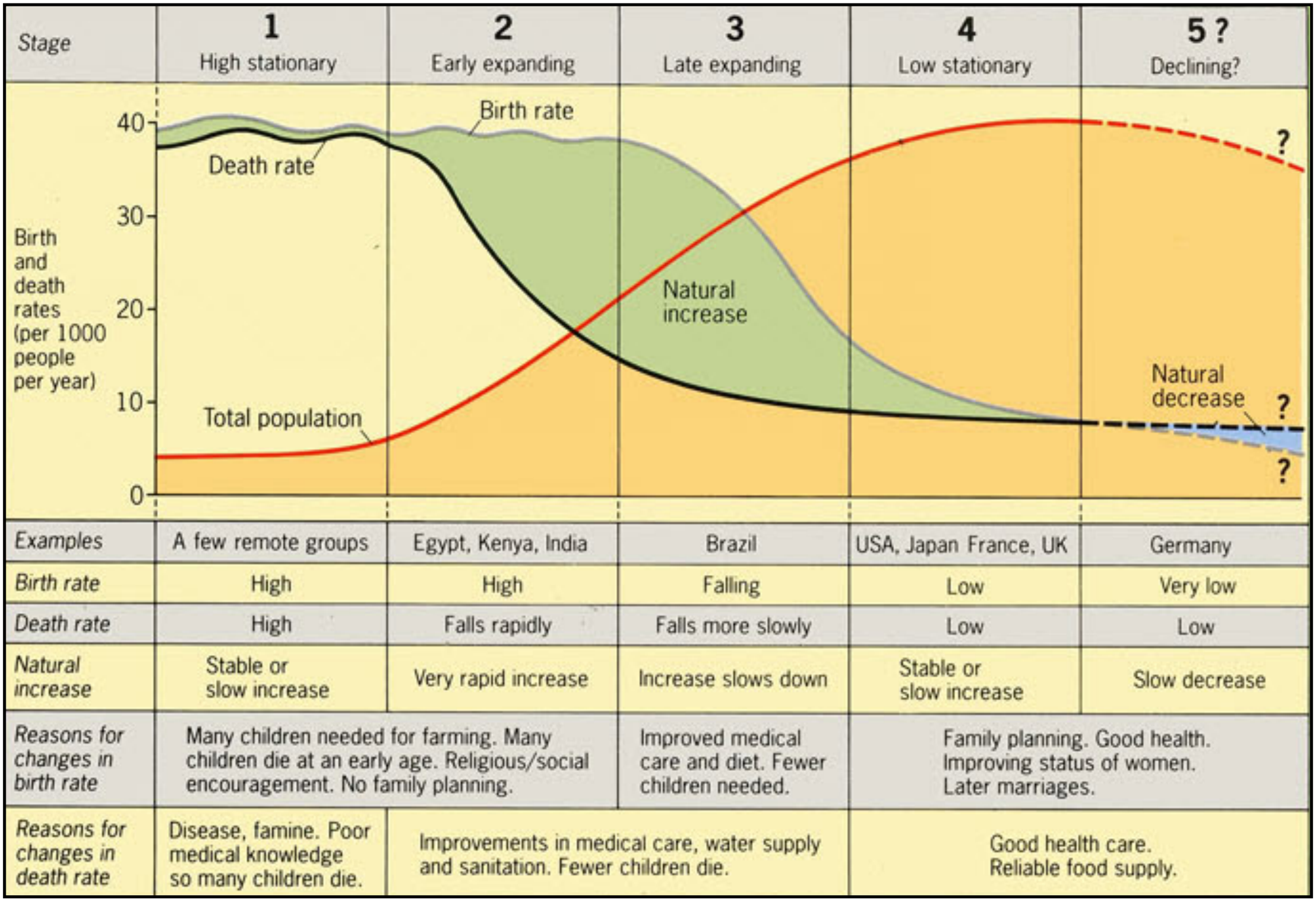
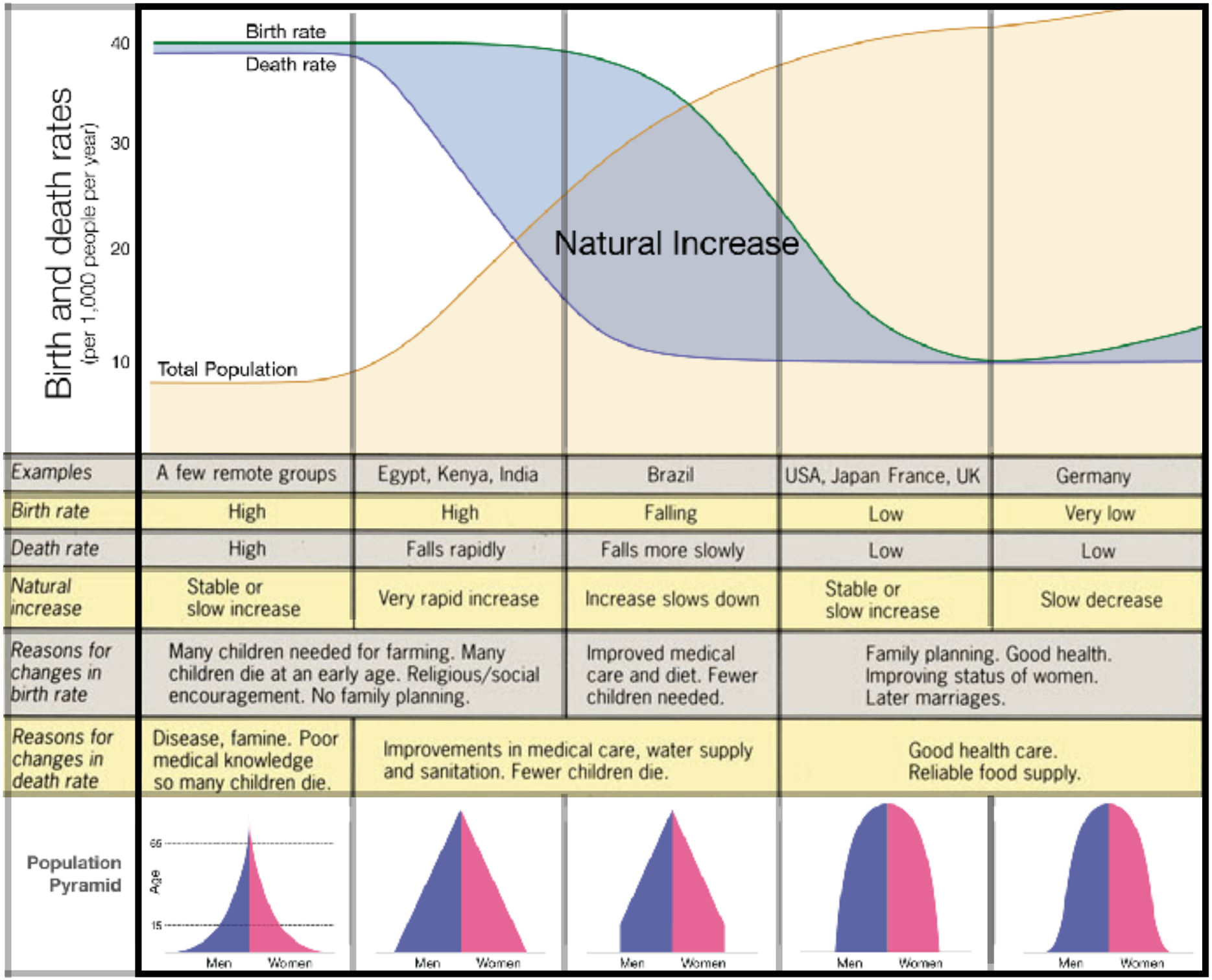


Examples	A few remote groups	Egypt, Kenya, India	Brazil	USA, Japan France, UK	Germany
Birth rate	High	High	Falling	Low	Very low
Death rate	High	Falls rapidly	Falls more slowly	Low	Low
Natural increase	Stable or slow increase	Very rapid increase	Increase slows down	Stable or slow increase	Slow decrease
Reasons for changes in birth rate	Many children needed for farming. Many children die at an early age. Religious/social encouragement. No family planning.		Improved medical care and diet. Fewer children needed.	Family planning. Good health. Improving status of women. Later marriages.	
Reasons for changes in death rate	Disease, famine. Poor medical knowledge so many children die.	Improvements in medical care, water supply and sanitation. Fewer children die.		Good health care. Reliable food supply.	

El modelo de "transición demográfica"



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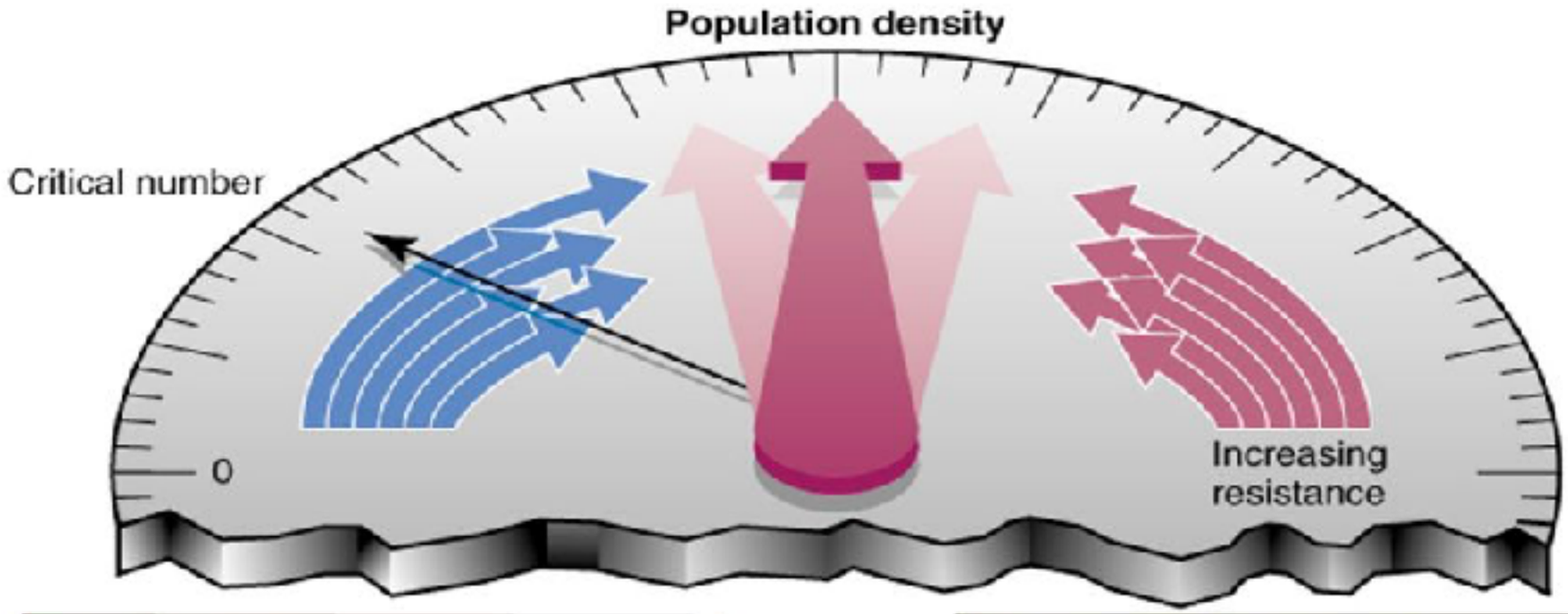
Population Pyramid					

RESISTENCIA MEDIOAMBIENTAL



Biotic Potential

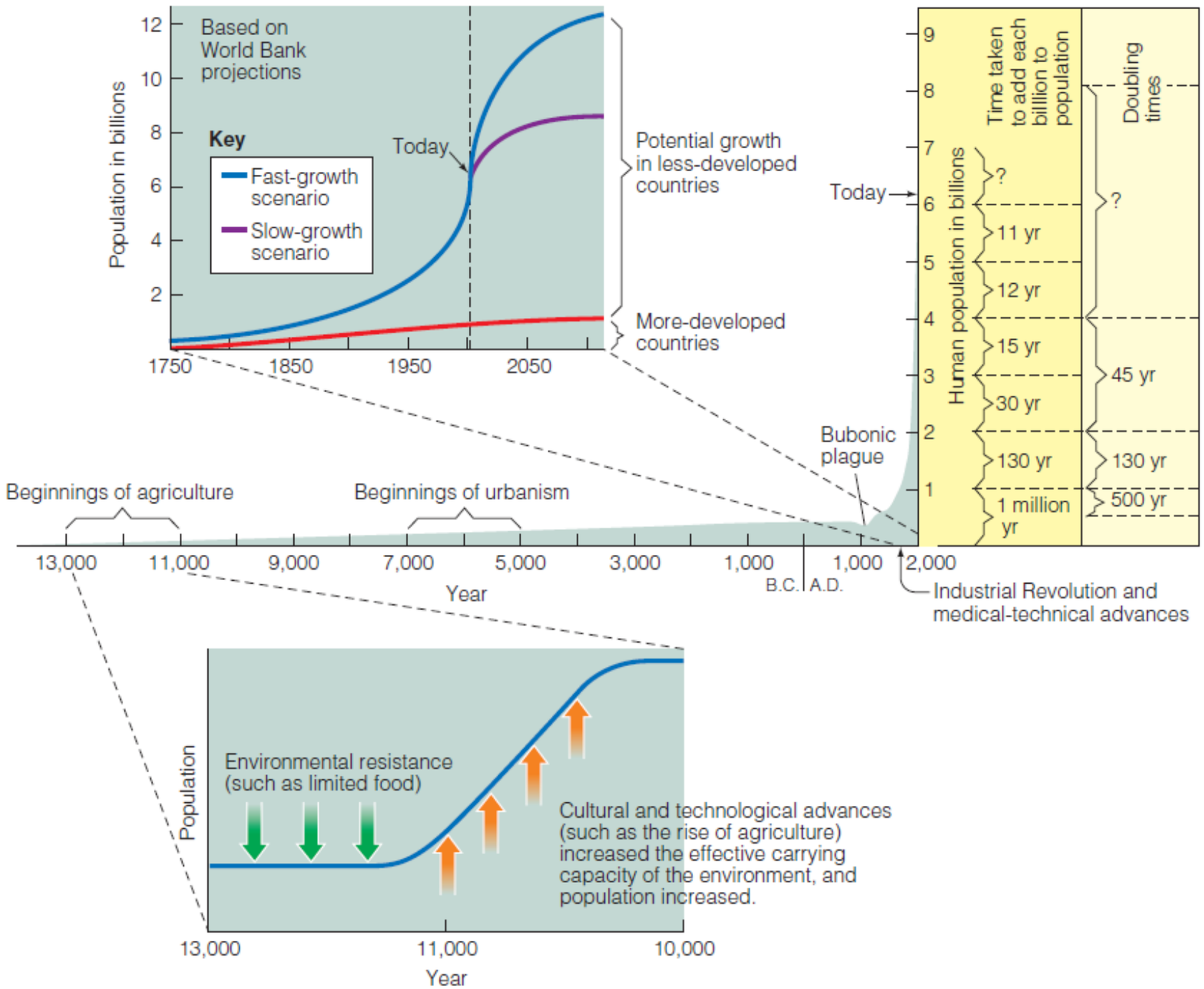
- Reproductive rate
- Ability to migrate (animals) or disperse (seeds)
- Ability to invade new habitats
- Defense mechanisms
- Ability to cope with adverse conditions

Environmental Resistance

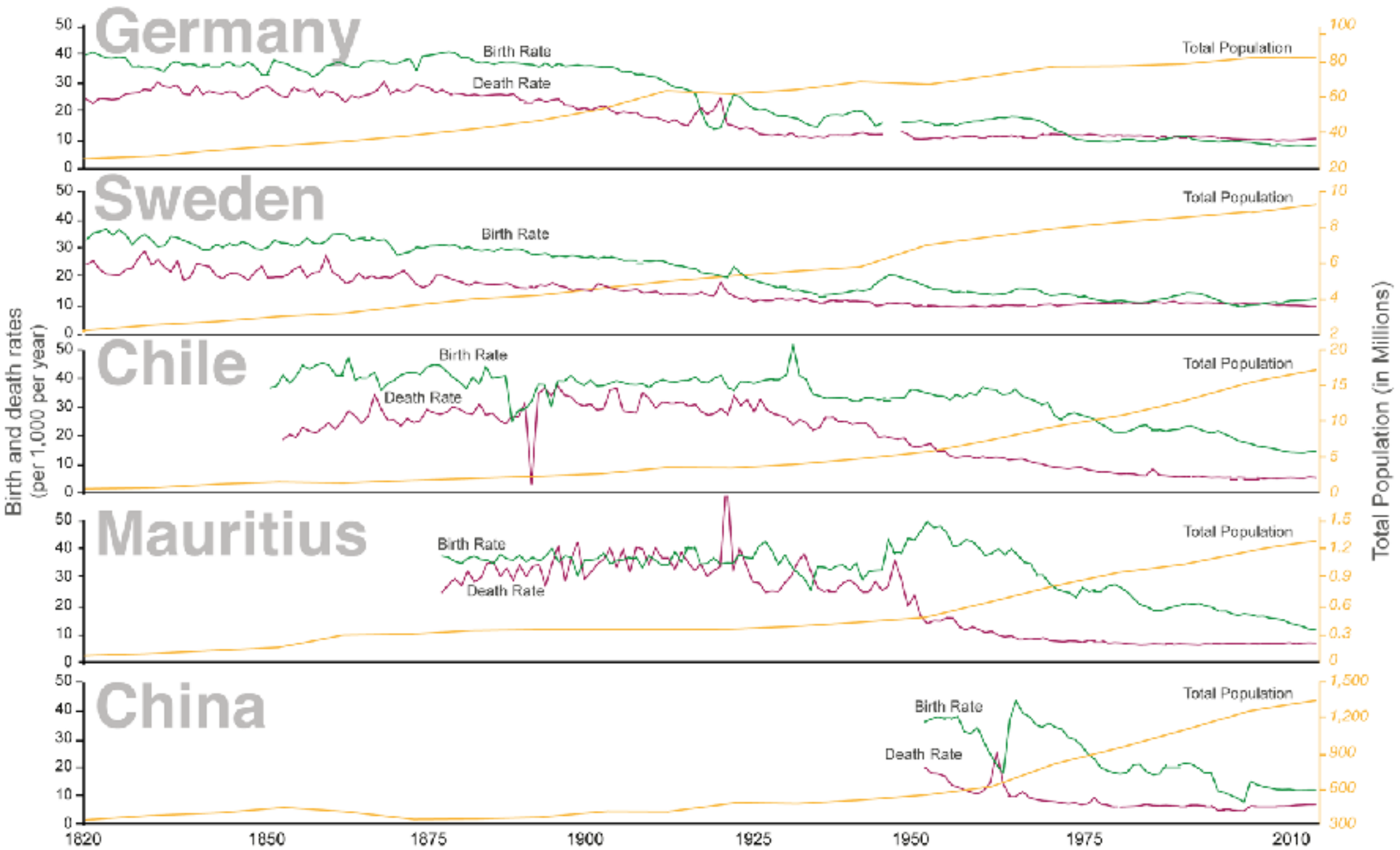
- Lack of food or nutrients
- Lack of water
- Lack of suitable habitat
- Adverse weather conditions
- Predators
- Disease
- Parasites
- Competitors

RESISTENCIA MEDIOAMBIENTAL

FIGURE 17.4 Human population and environmental resistance
Great technological advances, like the origin of agriculture and the Industrial Revolution, caused an easing of environm resistance, effectively increasing Earth's carrying capacity and allowing major, rapid increases in human population.



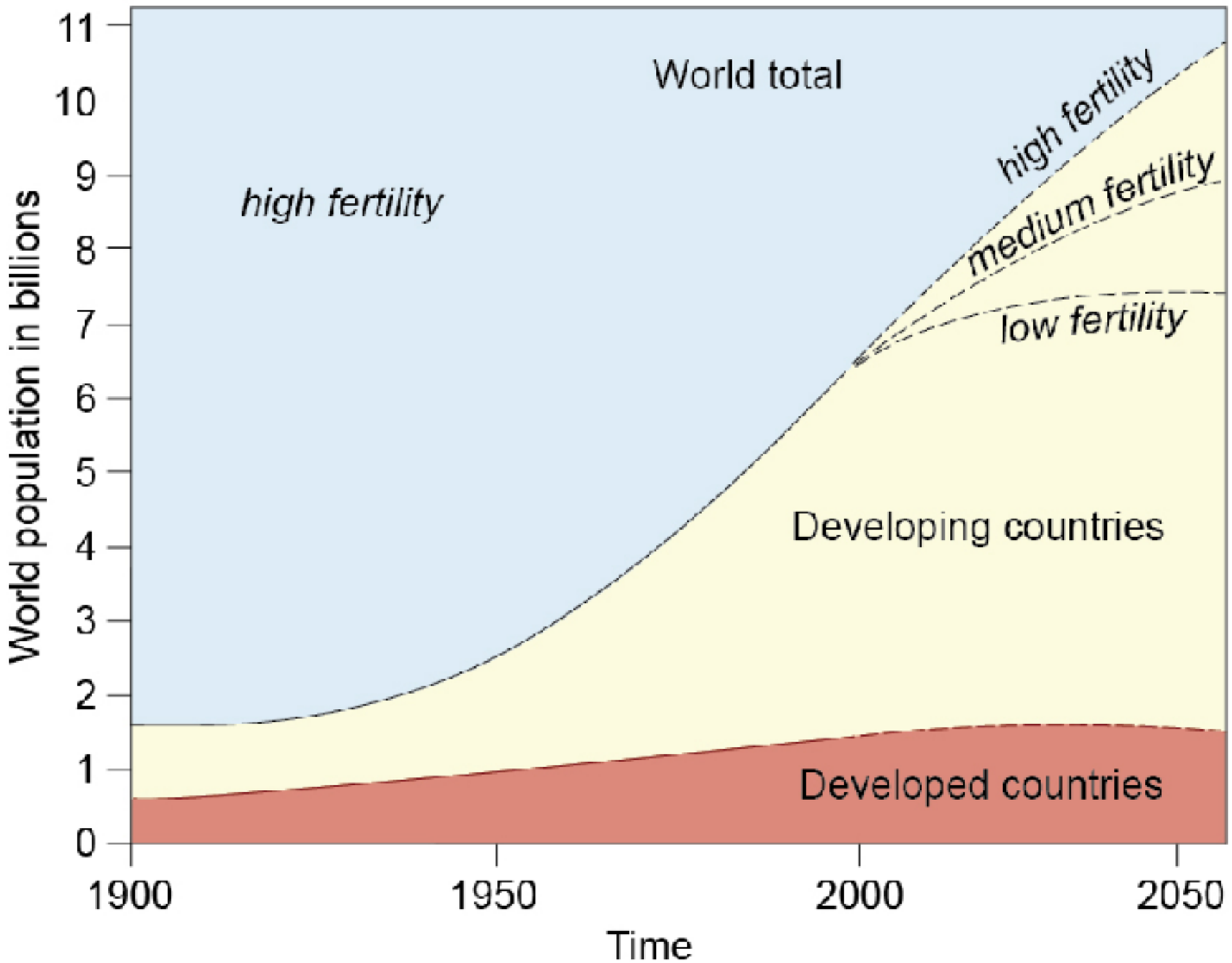
TRANSICION DEMOGRAFICA EN 5 PAISES



Data source: The data on birth rates, death rates and the total population are taken from the International Historical Statistics, edited by Palgrave Macmillan (April 2013).

The interactive data visualisation is available at OurWorldinData.org. There you find the raw data and more visualisations on this topic.

DIFERENCIA ENTRE PAISES EN DESARROLLO Y EN VIAS DE DESARROLLO



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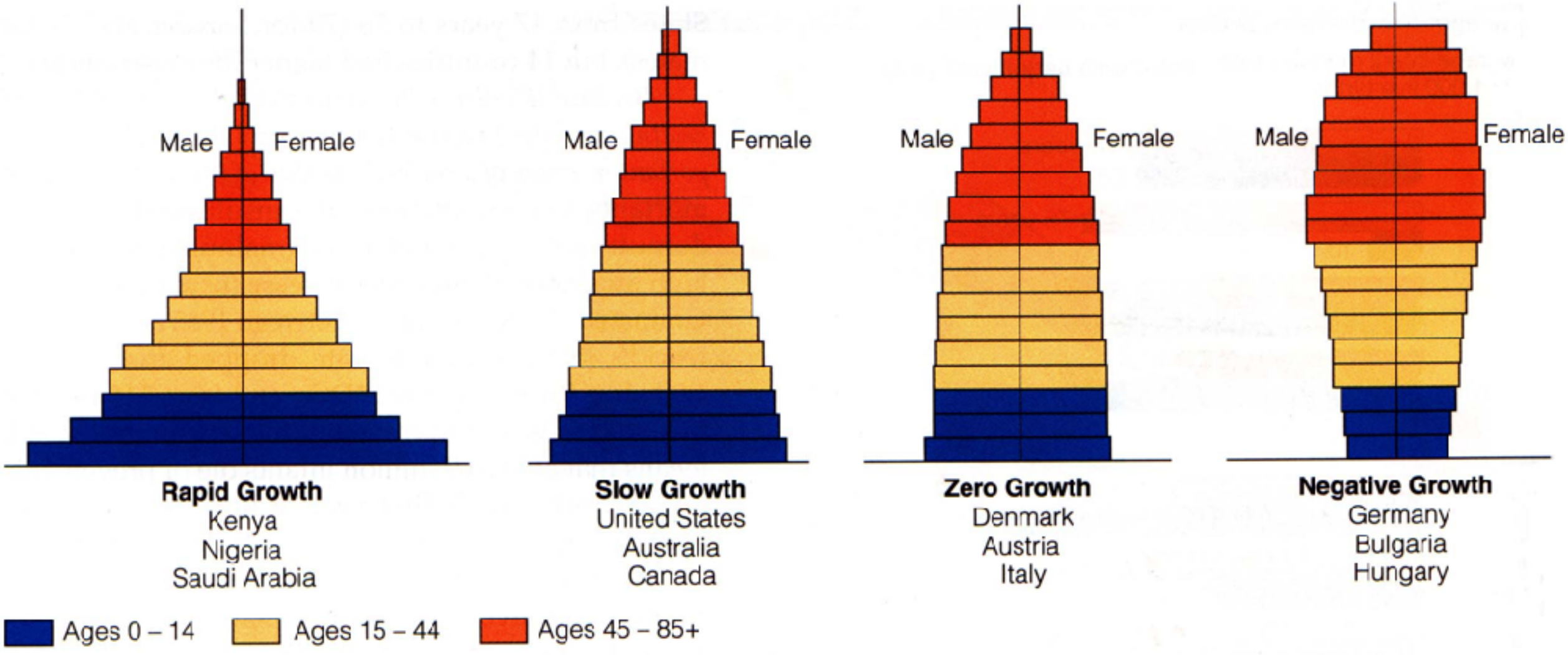
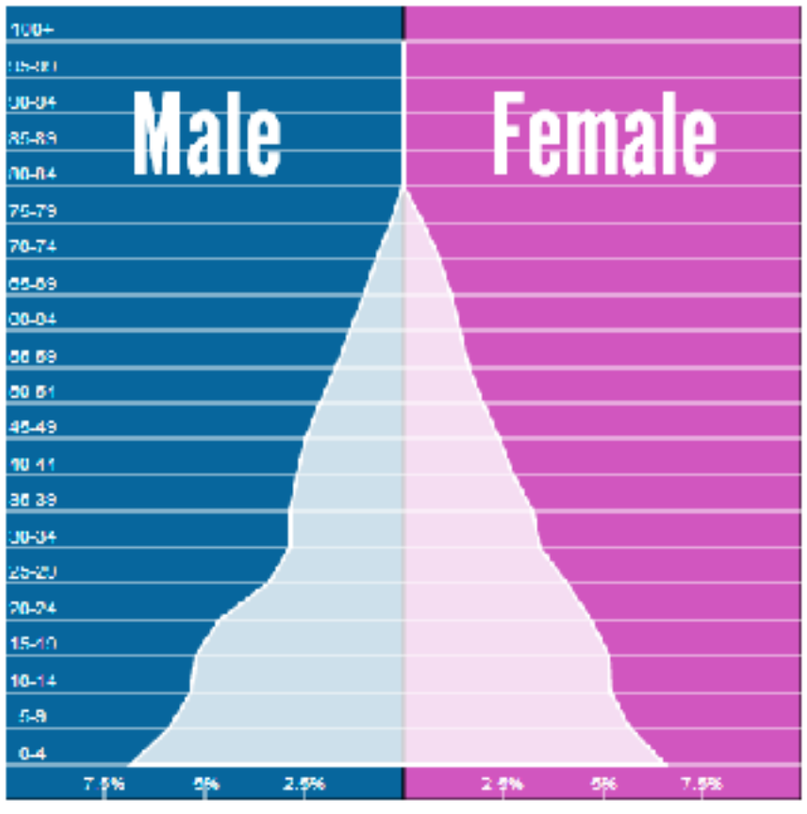


Figure 0 1 Population age structure diagrams for countries with rapid, slow, zero, and negative population growth rates. (Data from Population Reference Bureau)

DIFERENCIA ENTRE PAISES EN DESARROLLO Y EN VIAS DE DESARROLLO

Japan 1950

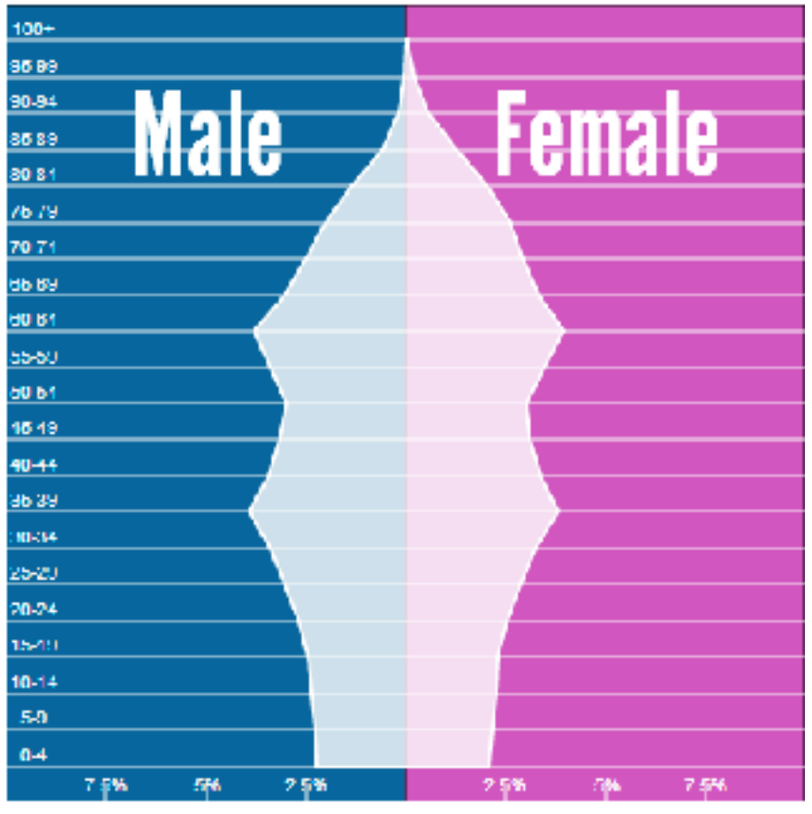
Population: 81.838.000



Link to this graph: http://populationpyramid.net/Japan/1950/

Japan 2010

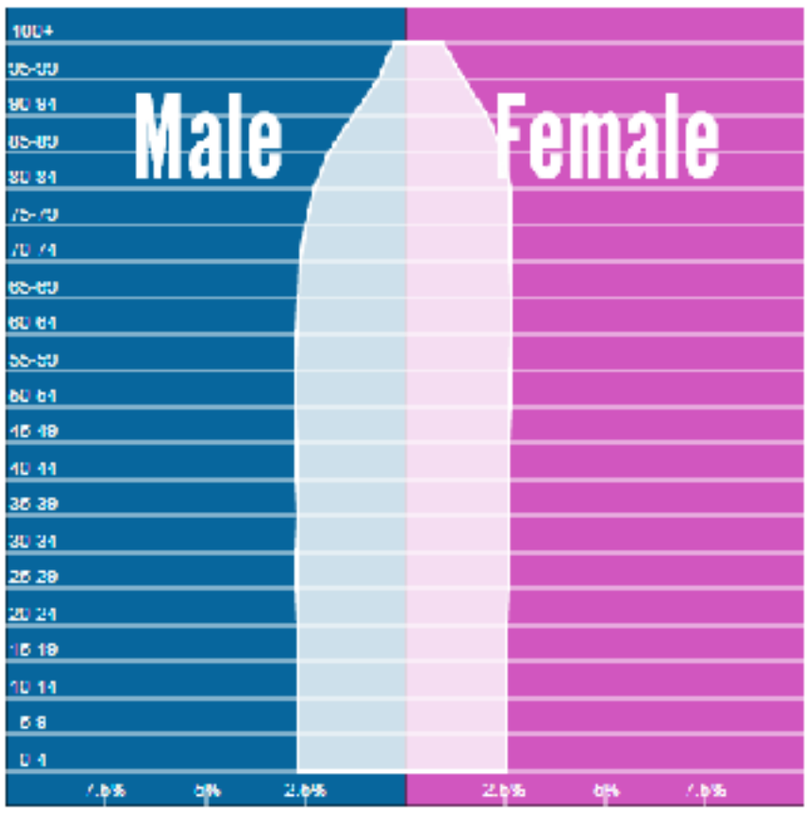
Population: 126.536.000



Link to this graph: http://populationpyramid.net/Japan/2010/

Japan 2100

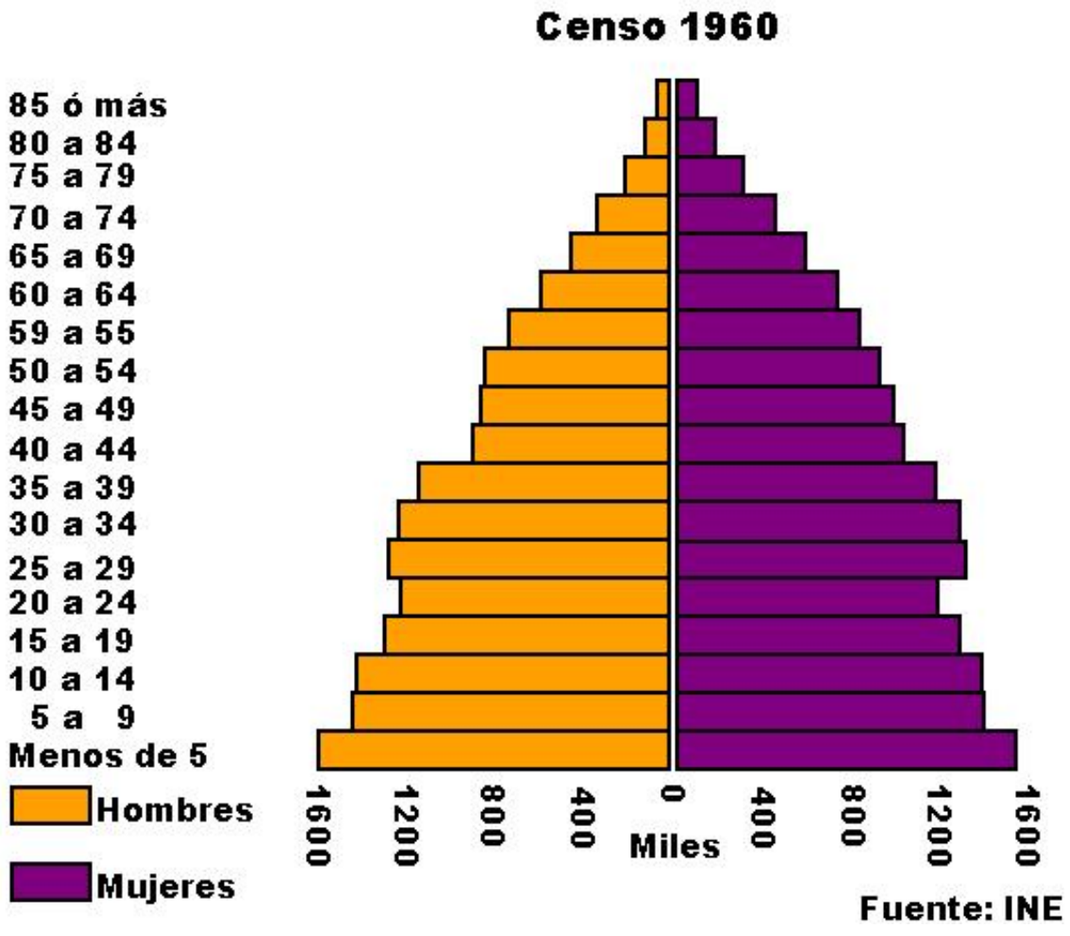
Population: 91.331.000

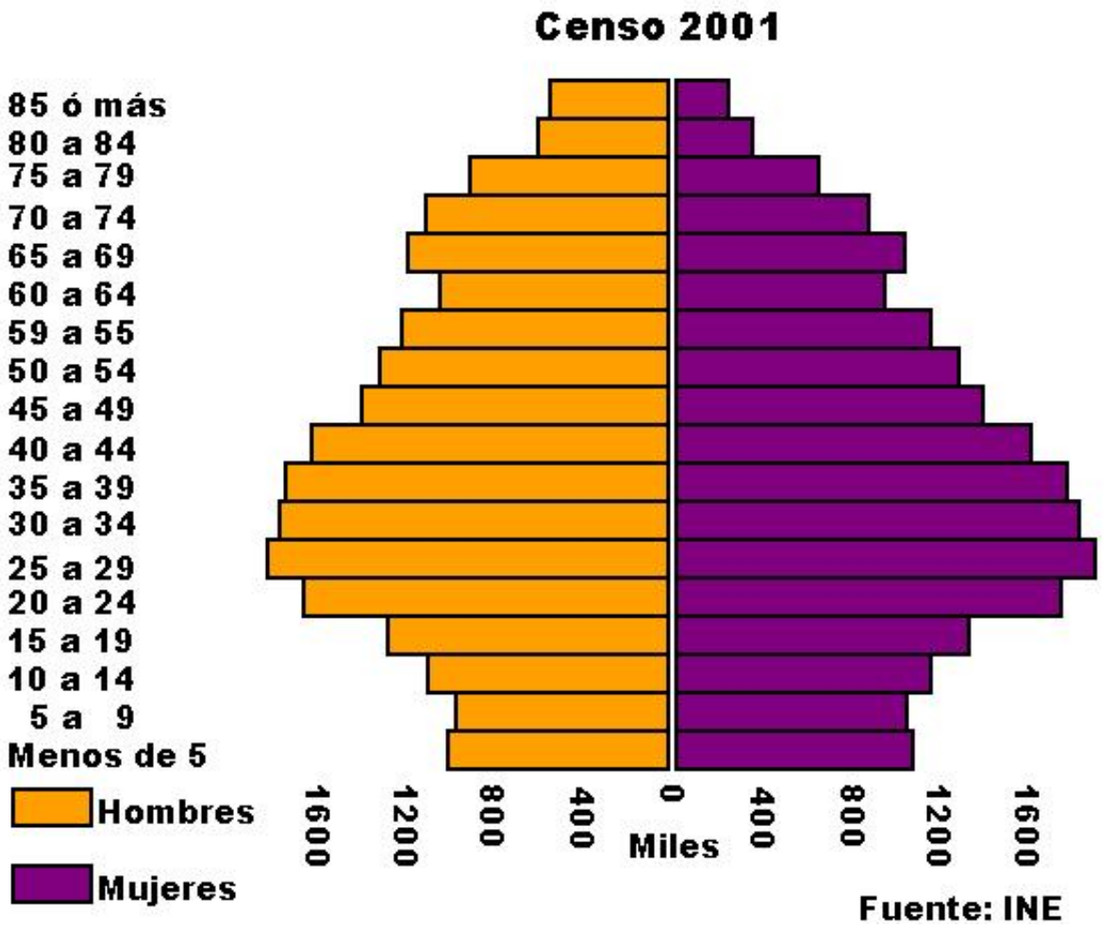


Link to this graph: http://populationpyramid.net/Japan/2100/

DIFERENCIA ENTRE PAISES EN DESARROLLO Y EN VIAS DE DESARROLLO

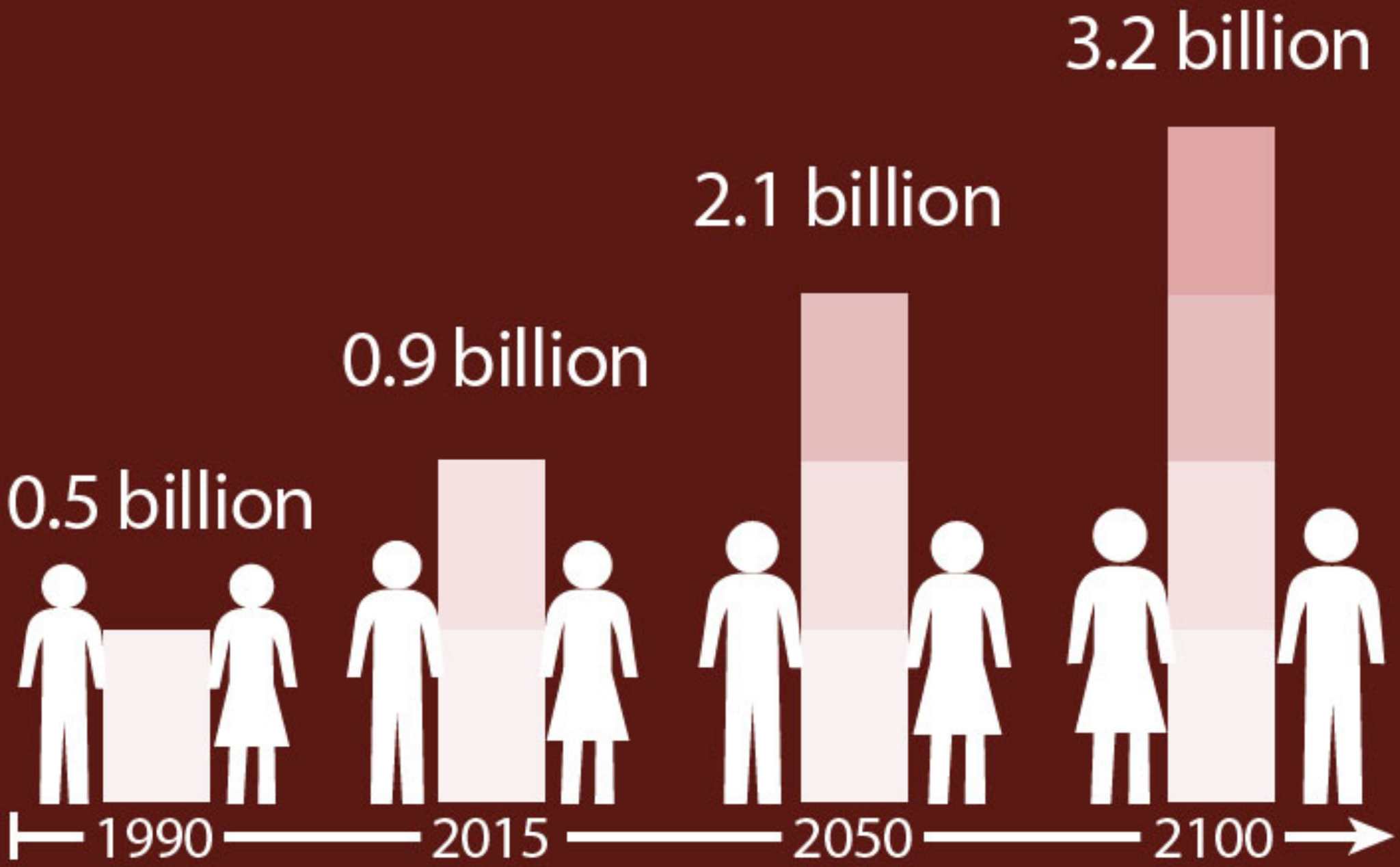
CHILE





Ageing Population

Projected global population aged 60 years and above



Source: United Nations Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2015 Revision*
Produced by: United Nations Department of Public Information

2015 TIME FOR GLOBAL ACTION FOR PEOPLE AND PLANET

ENVEJECIMIENTO

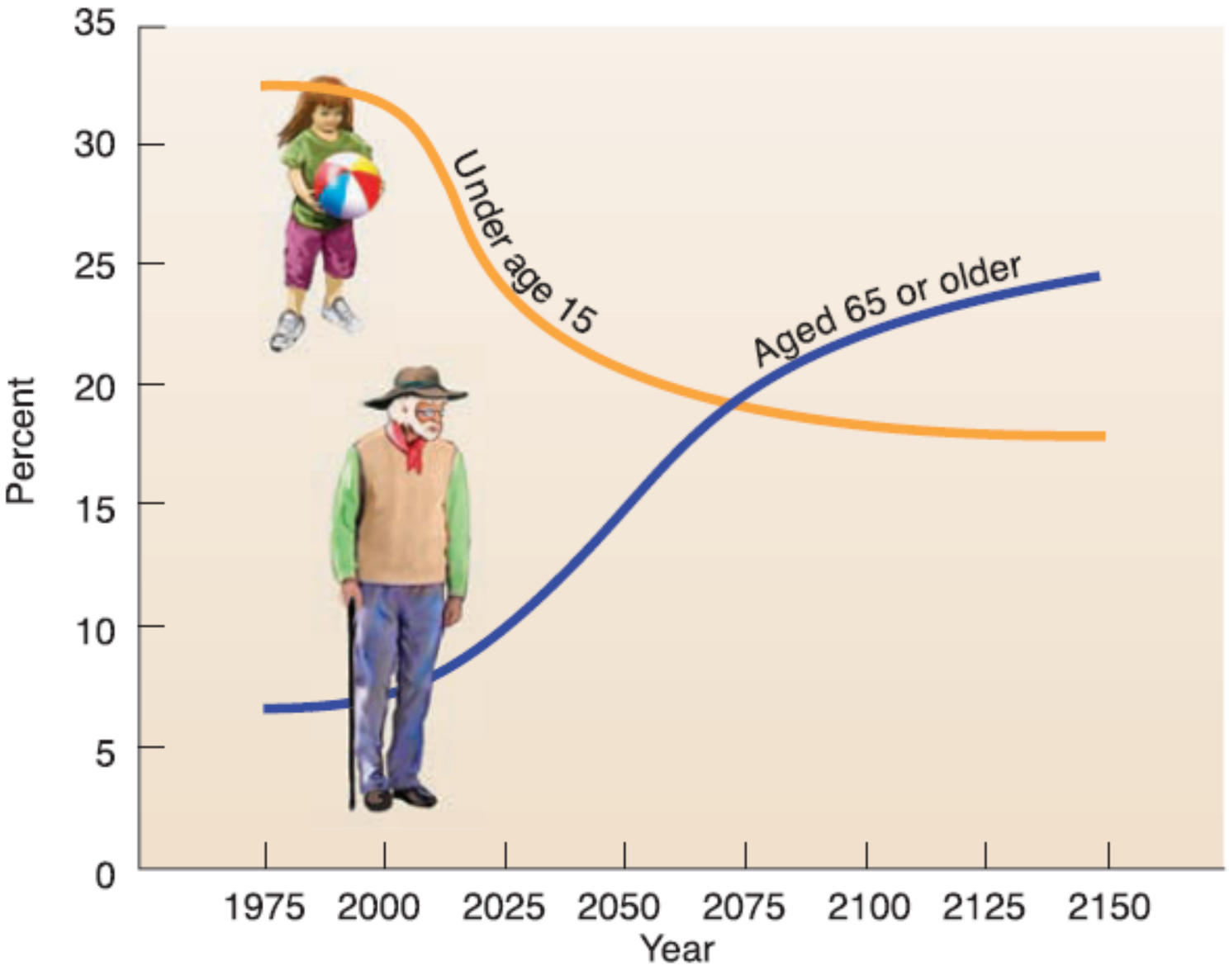
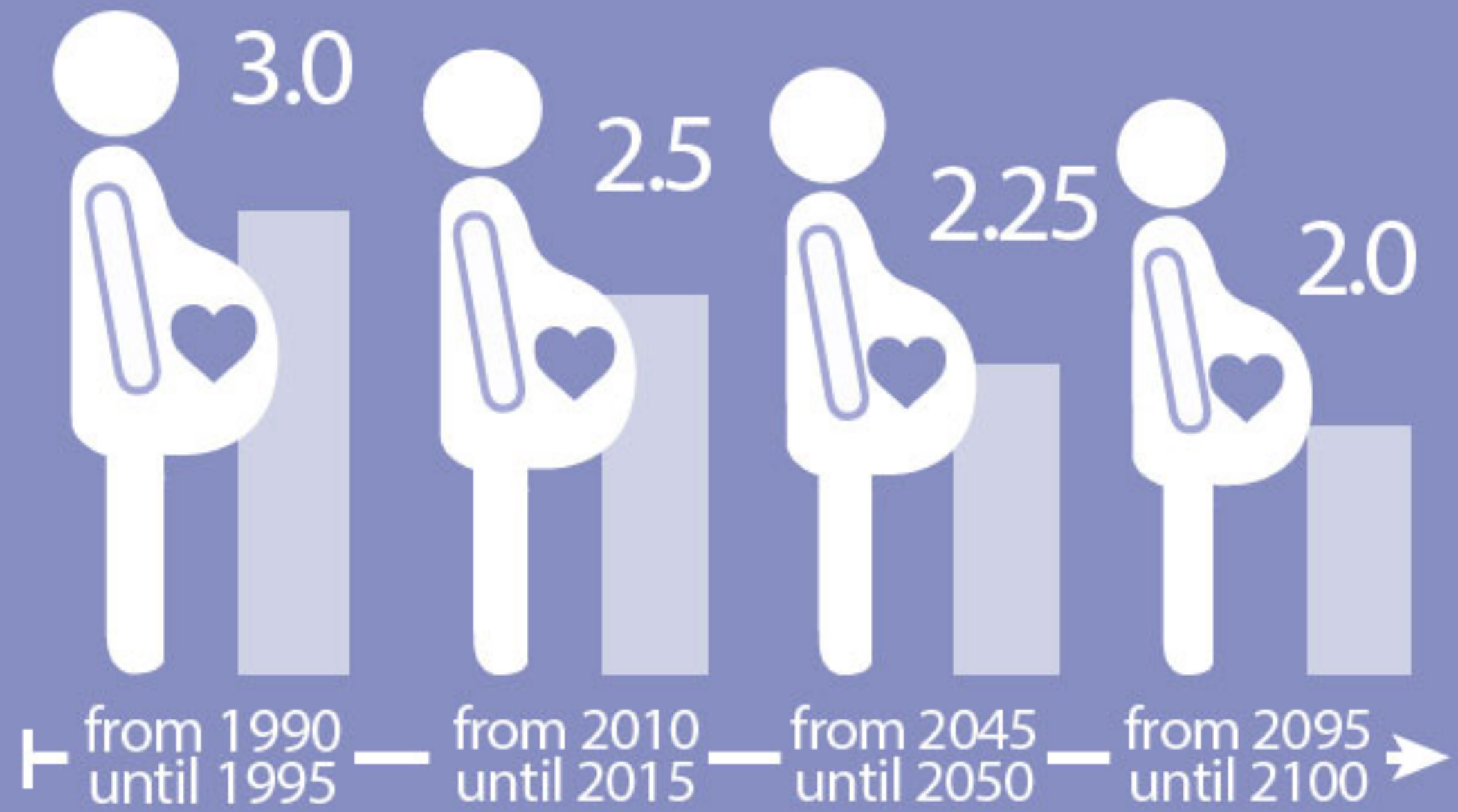


FIGURE 7.14 By the mid-twenty-first century, children under age 15 will make up a smaller percentage of world population, while people over age 65 will contribute a larger and larger share of the population.



Source: United Nations Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2015 Revision*
Produced by: United Nations Department of Public Information

2015 TIME FOR GLOBAL ACTION

FERTILIDAD

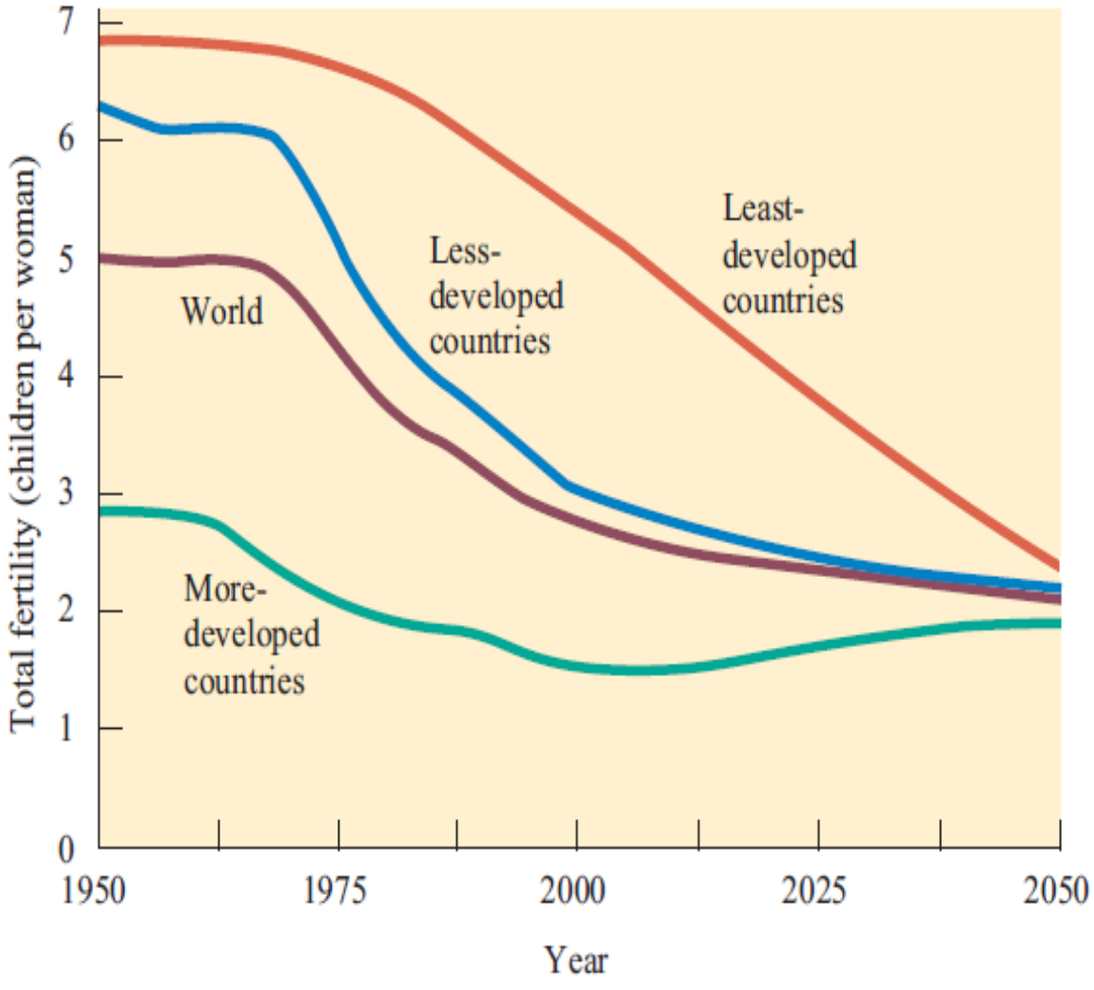
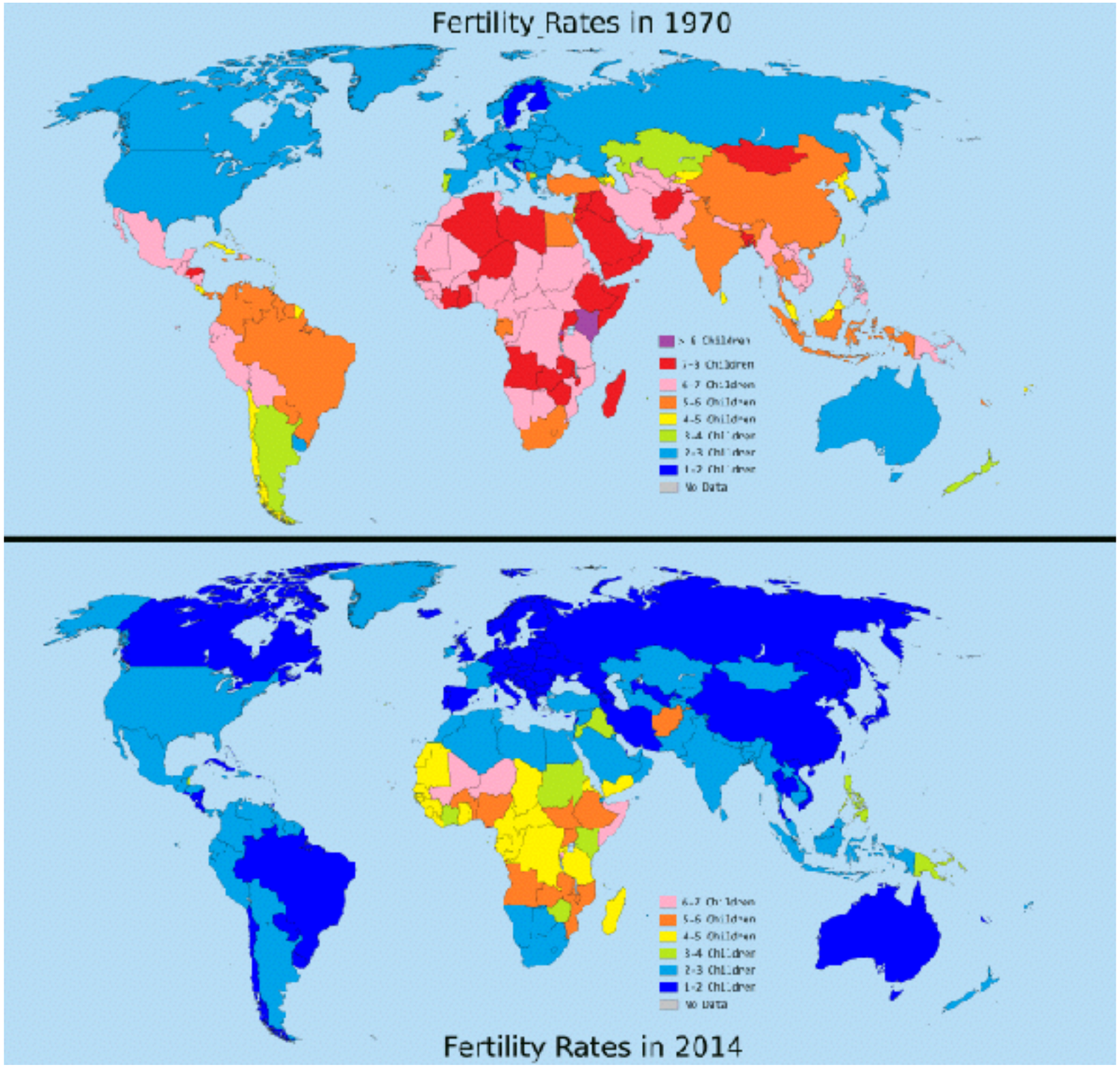


FIGURE 7.9 Average total fertility rates for less-developed countries fell by more than half over the past 50 years. Much of this dramatic change was due to China's one-child policy. Progress has been slower in the least-developed countries, but by 2050, they should be approaching the replacement rate of 2.1 children per woman of reproductive age.

FERTILIDAD



cy

Projected global life expectancy at birth

Between 1990 and 1995 — **65 Years**

Between 2010 and 2015 — **70 Years**

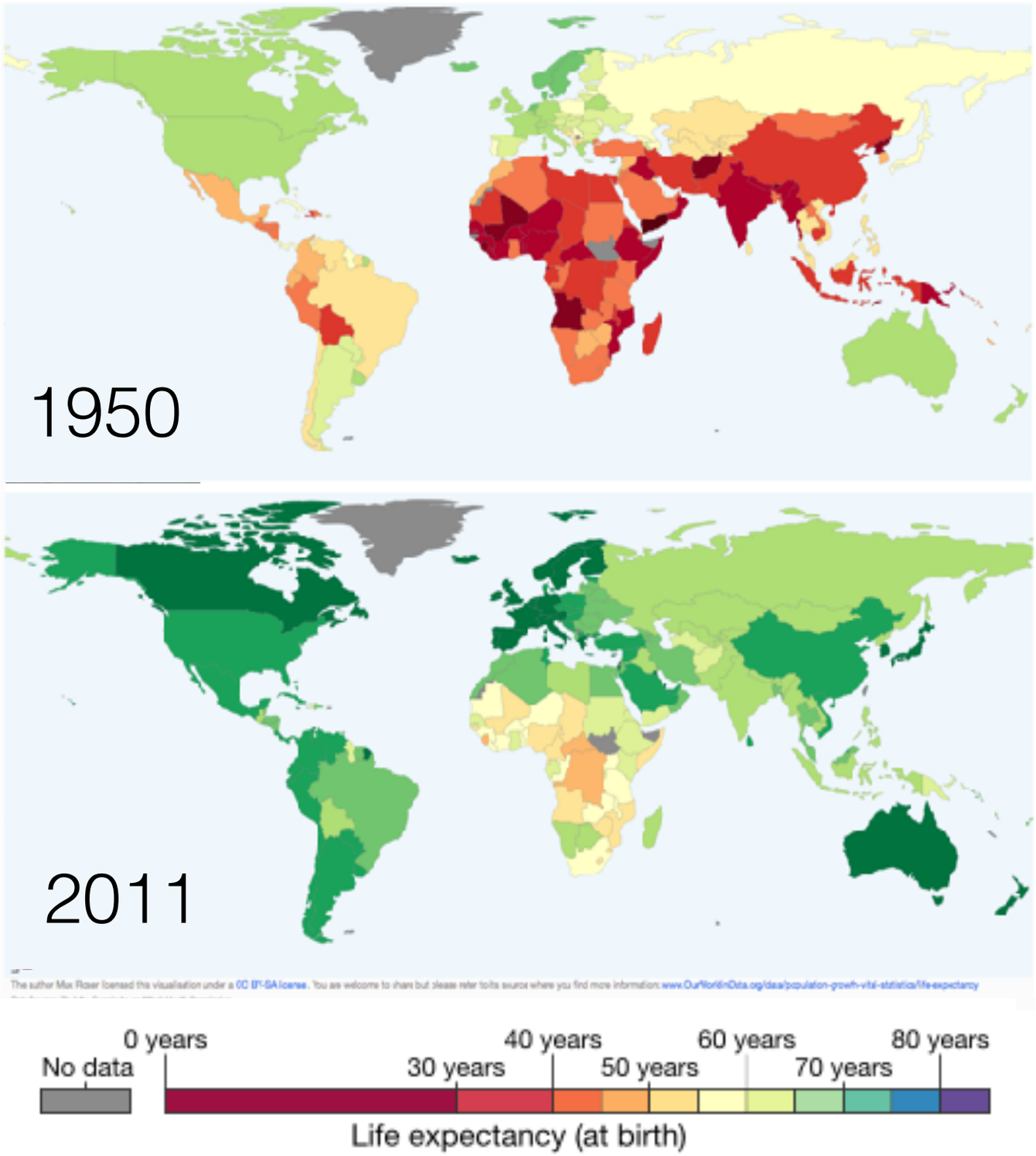
Between 2045 and 2050 — **77 Years**

Between 2095 and 2100 — **83 Years**

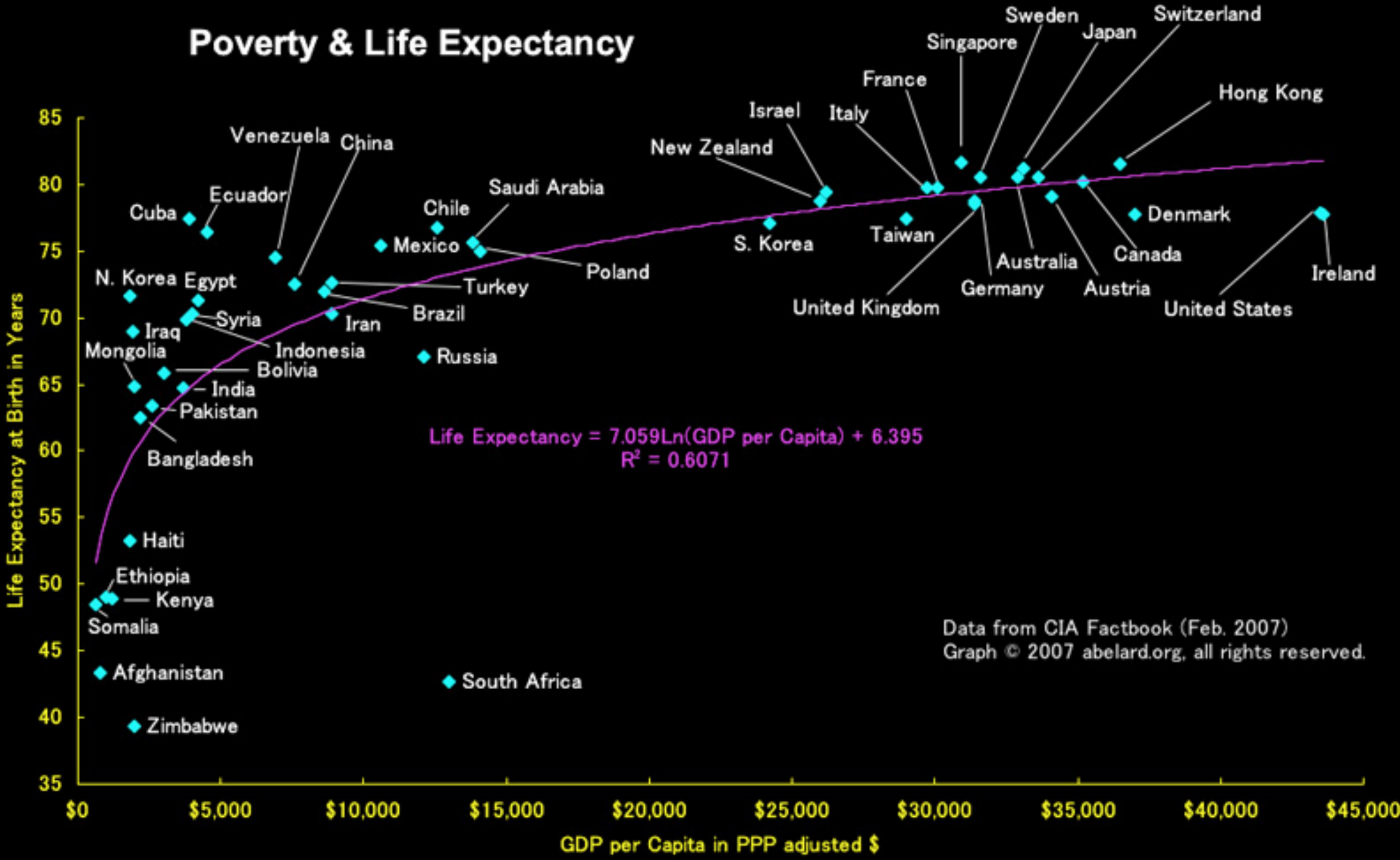
Source: United Nations Department of Economic and Social Affairs, Population Division, *World Population Prospects: The 2015 Revision*
Produced by: United Nations Department of Public Information

2015 TIME FOR GLOBAL ACTION

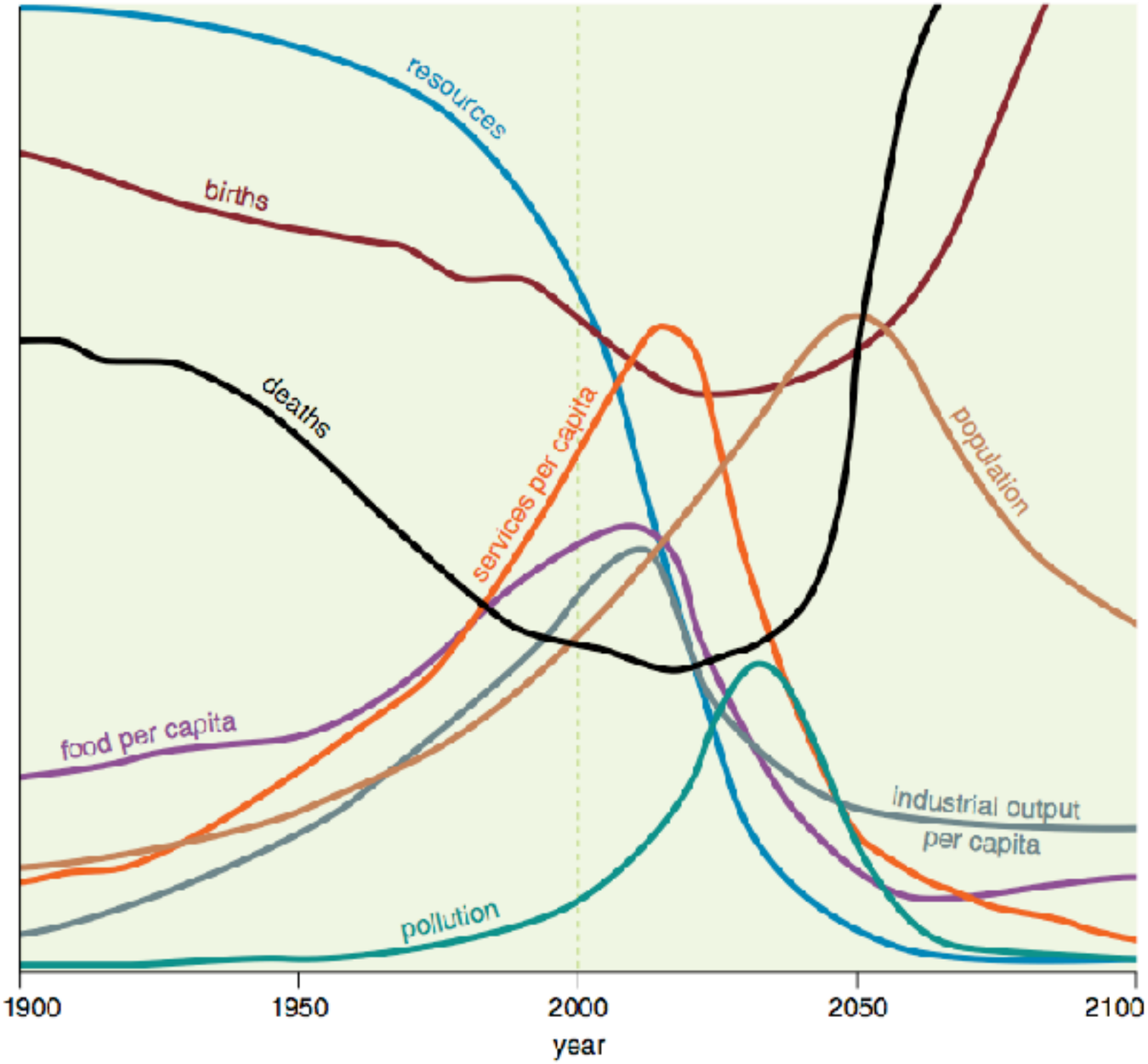
EXPECTATIVA DE VIDA



Poverty & Life Expectancy



LIMITE DEL CRECIMIENTO DE LA POBLACION



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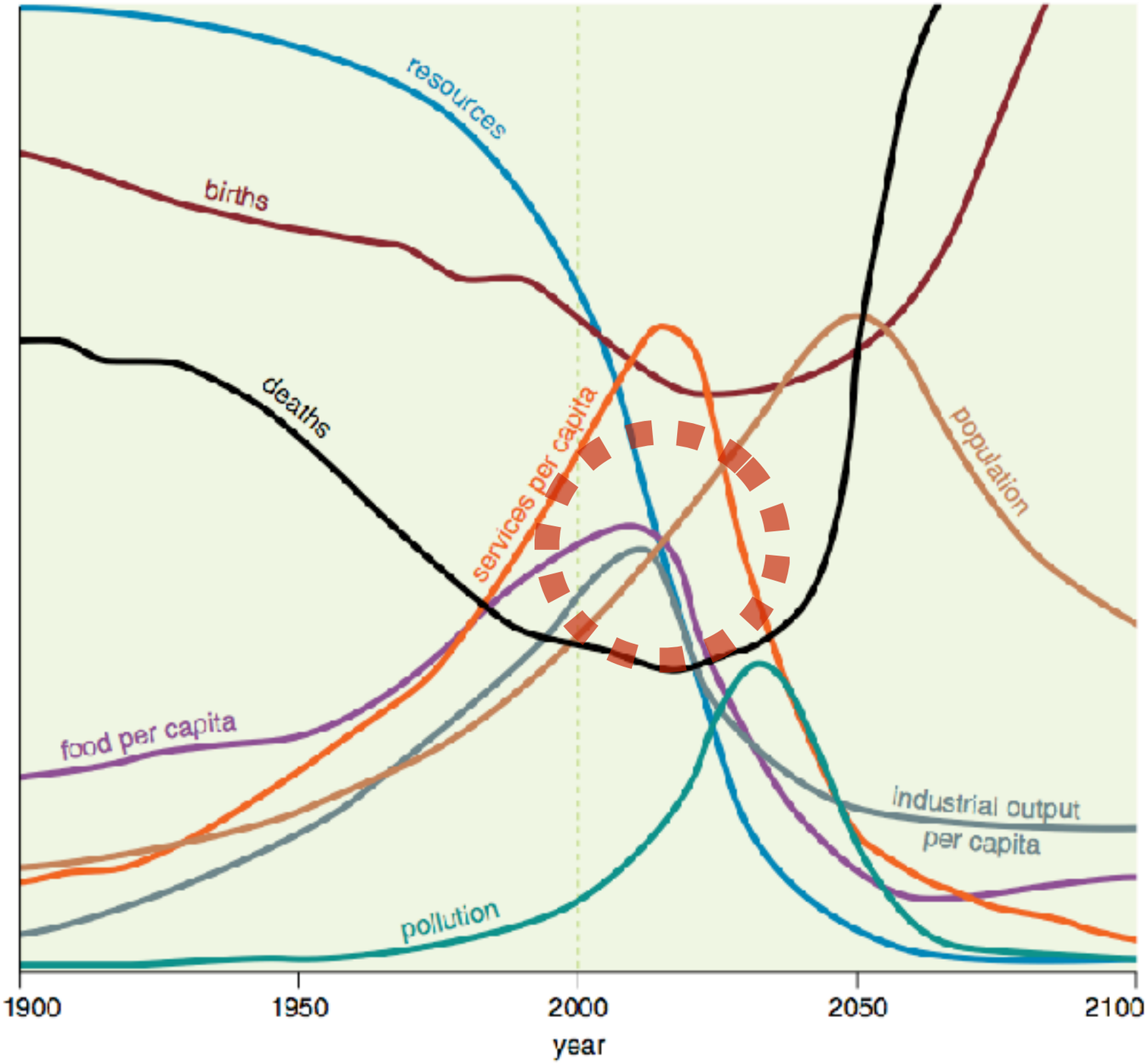
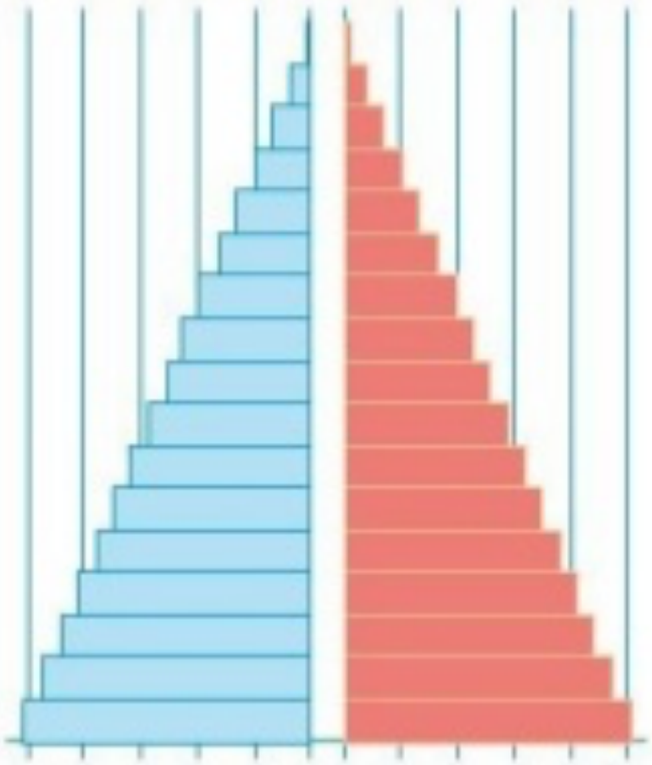


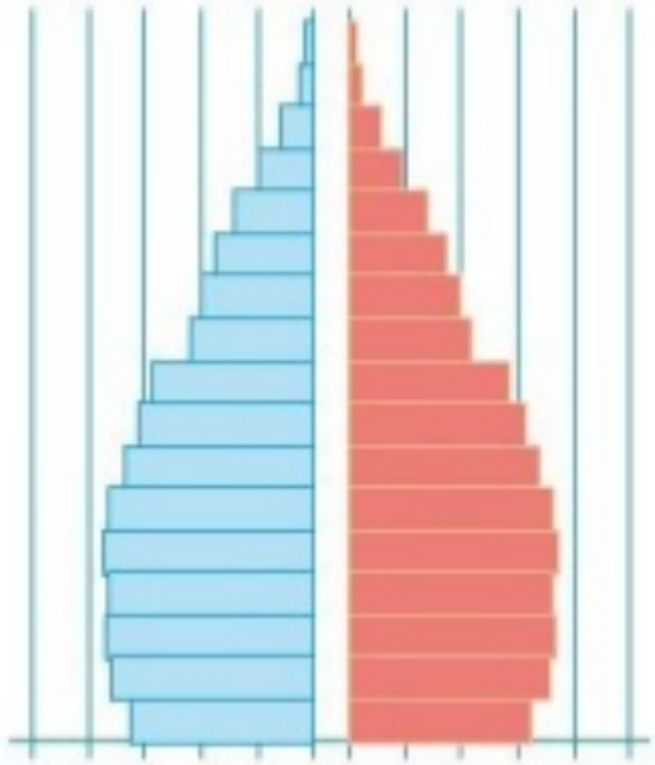
Tipos de Pirámide de Población

Pirámide triangular



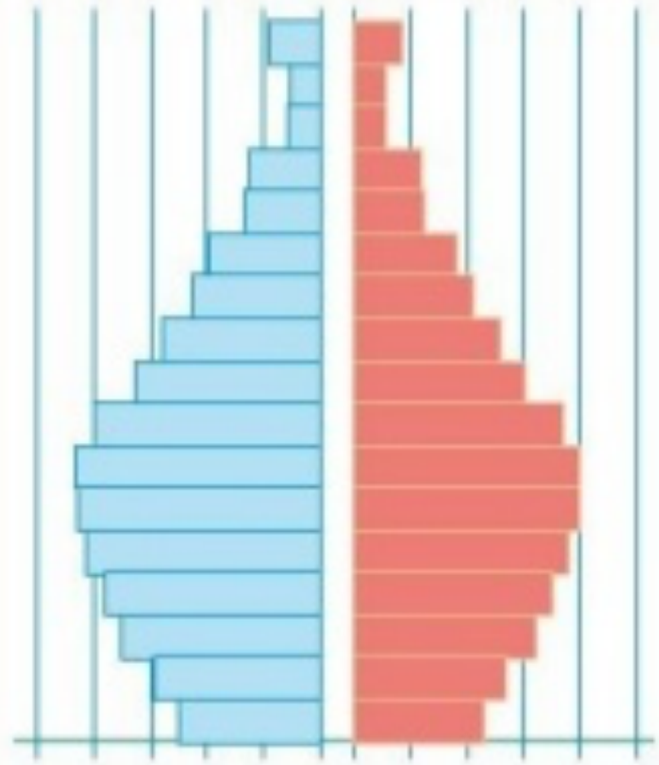
Se presenta en una población joven. Su base es ancha, debido a la existencia de altas tasas de natalidad. La población desciende rápidamente hacia la cima, reflejando una esperanza de vida baja y poca población anciana. Es característica de países con bajo desarrollo económico-social, y representan un régimen demográfico antiguo. Ej. Chad u otros países de África subsahariana; en general, países pobres.

Pirámide campana



U ojiva, indica preeminencia de población adulta. Tiene una base moderada, pues se ha iniciado el descenso de la natalidad. La población disminuye lentamente hacia arriba, debido a una esperanza de vida alta. Caracteriza a países en vías de desarrollo. Ej. Argentina, u otros países en régimen de transición demográfica correspondiente a países emergentes.

Pirámide bulbo



O urna, es propia de una población envejecida. Presenta una base estrecha, debido a una natalidad baja y en descenso. La población disminuye lentamente hacia la cima, debido a una esperanza de vida muy alta; el porcentaje de ancianos es alto. Representa a países desarrollados. Ej. Canadá, u otros países con población envejecida; en general, países de alto desarrollo económico.

Hoy la **humanidad usa** el equivalente de **1,5 planetas** para proveer los recursos que usamos y absorbemos nuestros desechos. Esto significa que ahora toma **la Tierra un año y seis meses para regenerar lo que usamos en un año.**

Global Footprint Network

Developing Countries

X

X

=

Population (**P**) X Consumption per person (affluence, **A**) X Technological impact per unit of consumption (**T**) = Environmental impact of population (**I**)

X

X

=

Developed Countries

Si consumiéramos todos como los australianos….

WHAT'S YOUR PROBLEM?

I DON'T WISH TO INTERFERE BUT DO YOU REALIZE THAT WORLD POPULATION IS GOING TO INCREASE BY NEARLY 50% IN TWENTY YEARS? WHAT ARE YOU GOING TO DO ABOUT IT?

WHAT'S WRONG WITH PEOPLE? I LIKE PEOPLE.

WELL SO DO I, OF COURSE BUT YOU SEE THE WORLD'S RESOURCES CAN'T SUPPORT AN EVER-INCREASING POPULATION.

I SEE. SO IT'S A PROBLEM OF RESOURCES AS WELL AS PEOPLE?

YES.

SO THE ANSWER IS RESOURCE CONTROL AS WELL AS BIRTH CONTROL?

YE . . .ES

WELL THEN, I DON'T WANT TO INTERFERE BUT DO YOU REALIZE THAT THE RICH 20% OF THE WORLD CONSUME ABOUT 80% OF THE RESOURCES? WHAT ARE YOU GOING TO DO ABOUT THAT?

Estimates of Earth's carrying capacity

= one estimate

6 STUDIES SAY
≤ 2 billion

7 STUDIES SAY
≤ 4 billion

20 STUDIES SAY
≤ 8 billion

14 STUDIES SAY
≤ 16 billion

6 STUDIES SAY
≤ 32 billion

7 STUDIES SAY
≤ 64 billion

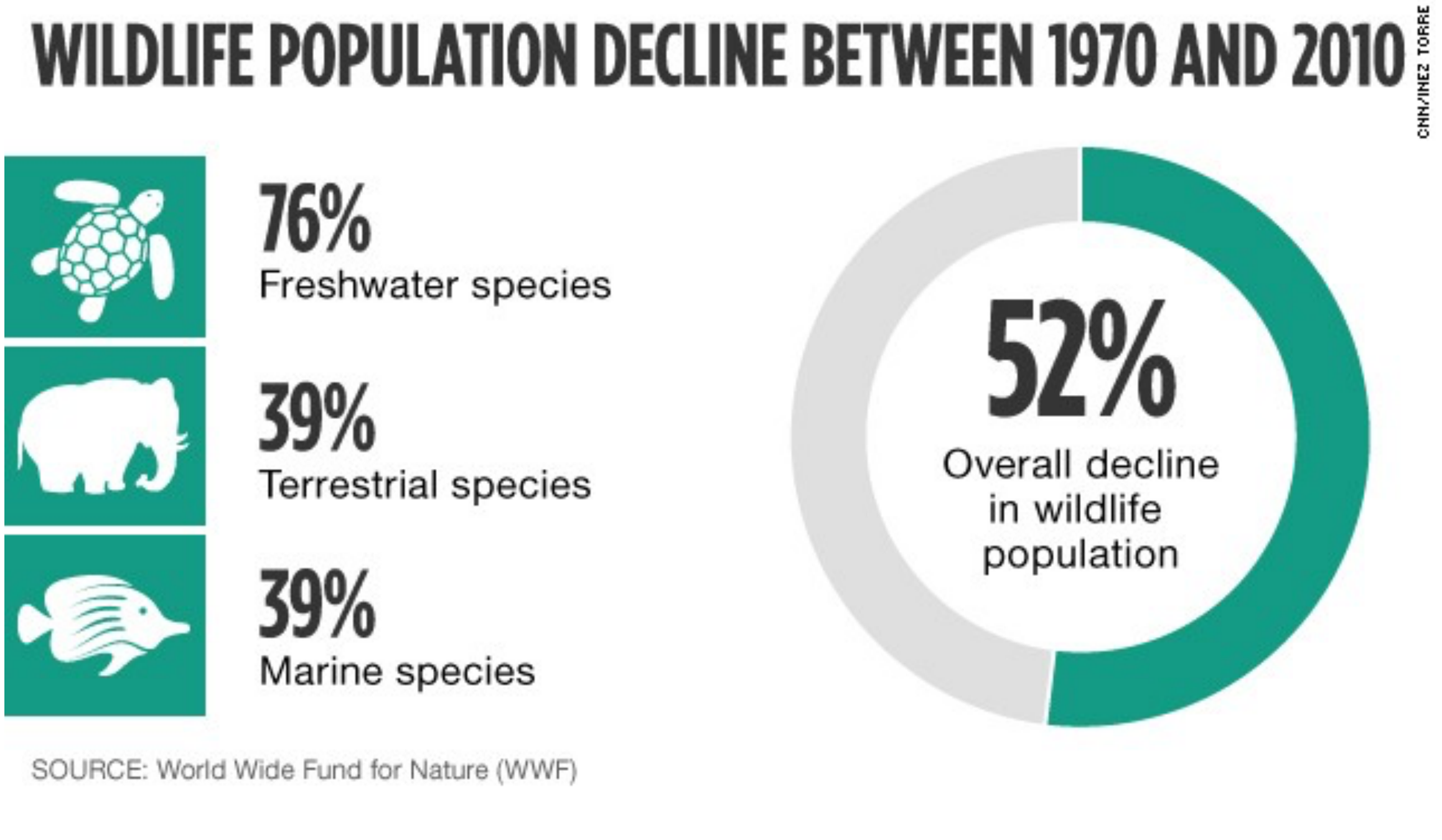
2 STUDIES SAY
≤ 128 billion

1 STUDY SAYS
≤ 256 billion

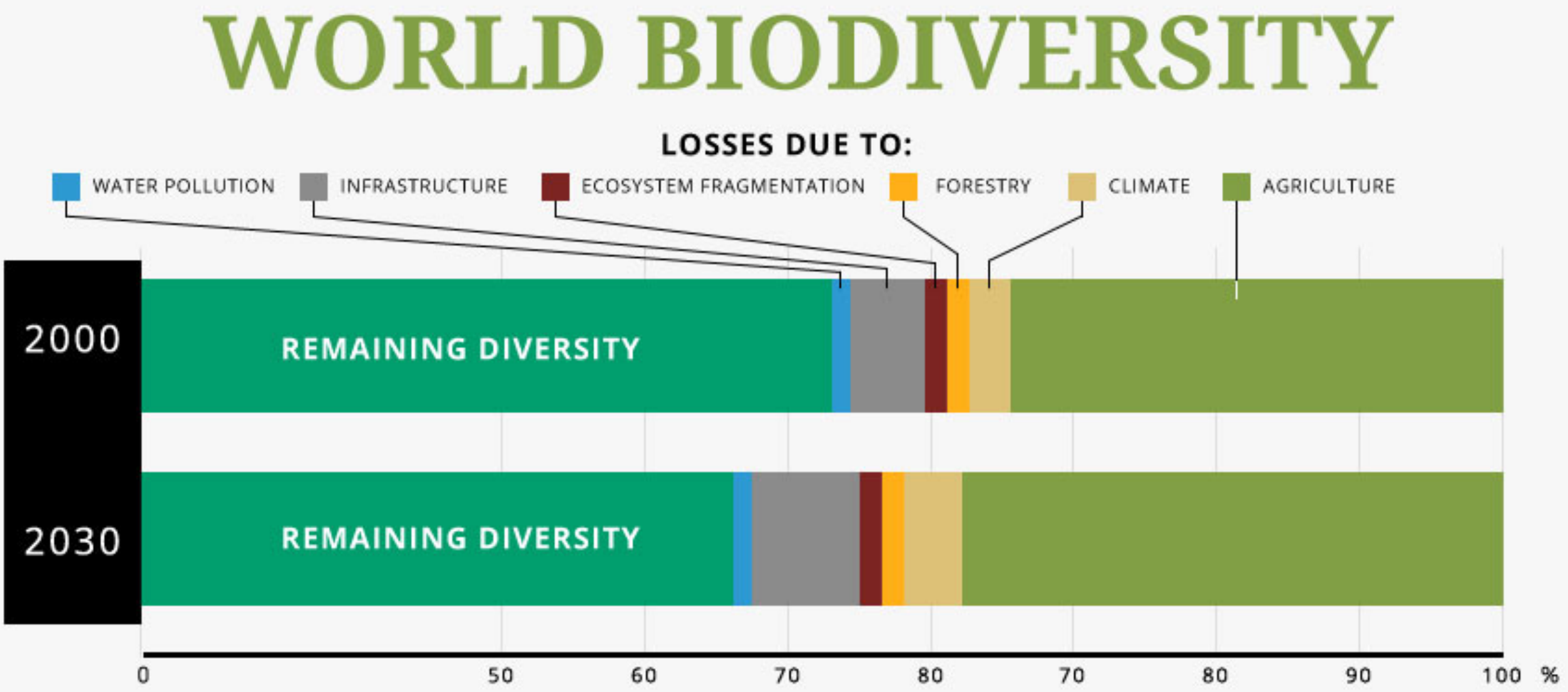
1 STUDY SAYS
≤ 512 billion

1 STUDY SAYS
≤ 1,024 billion

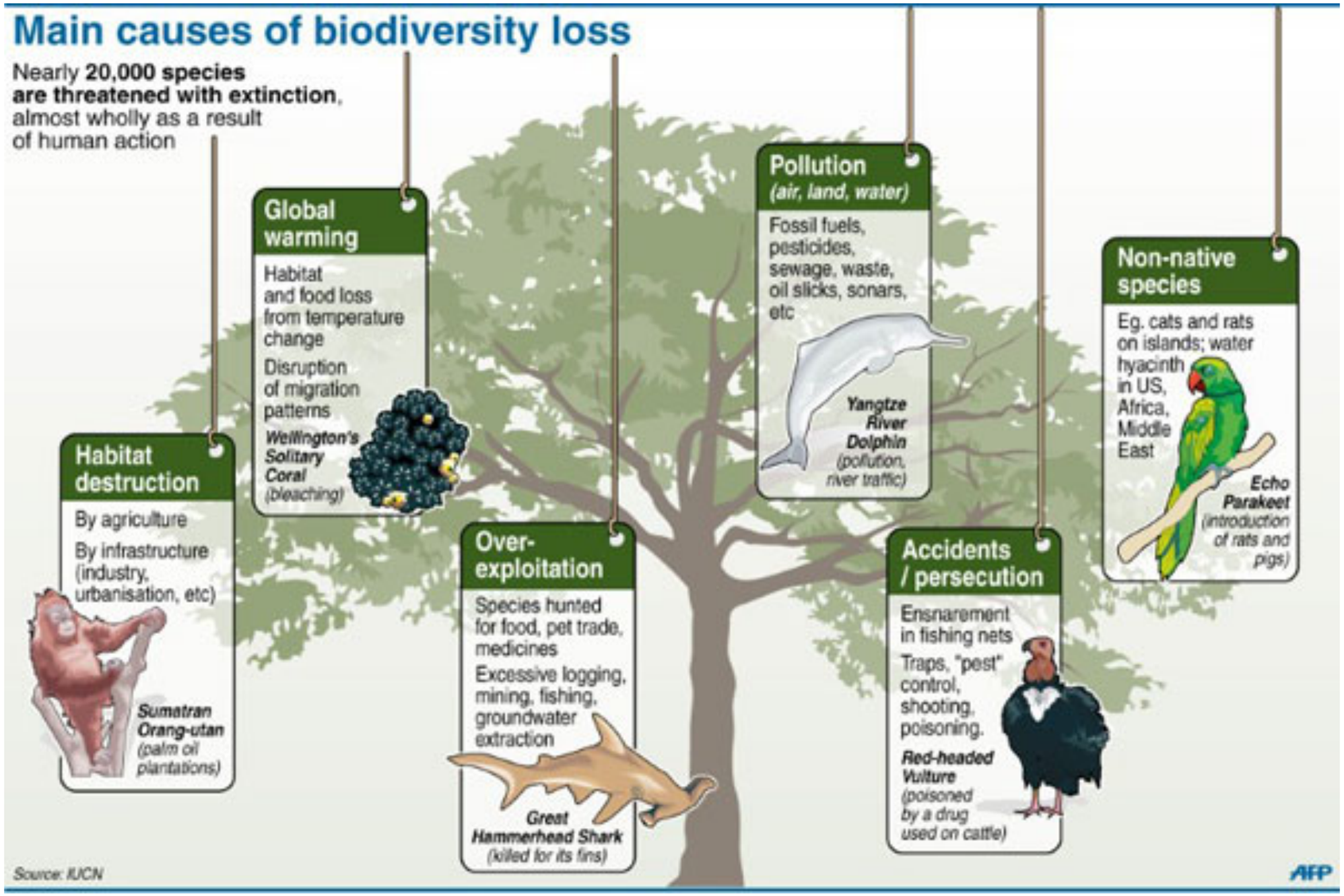
PERDIDA DE BIODIVERSIDAD



PERDIDA DE BIODIVERSIDAD



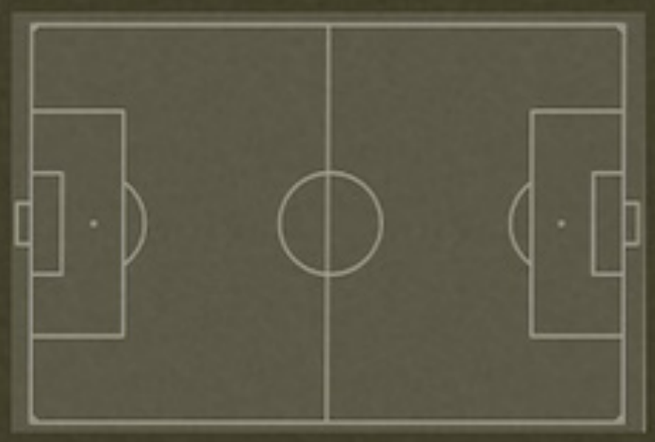
PERDIDA DE BIODIVERSIDAD



DESFORESTACION

Up to 20%

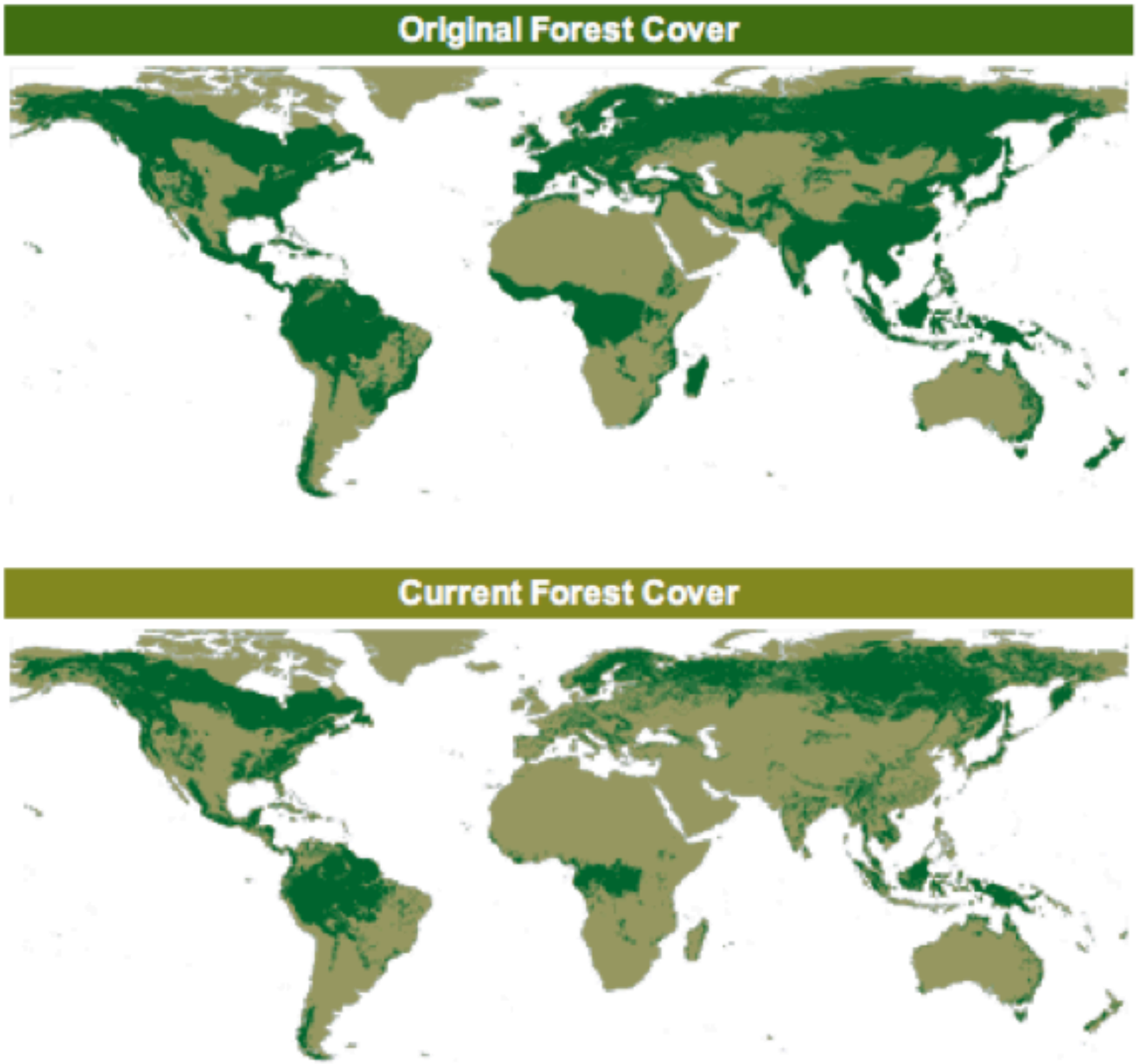
The annual global greenhouse gas emissions due to deforestation, more than the entire transport sector of the world



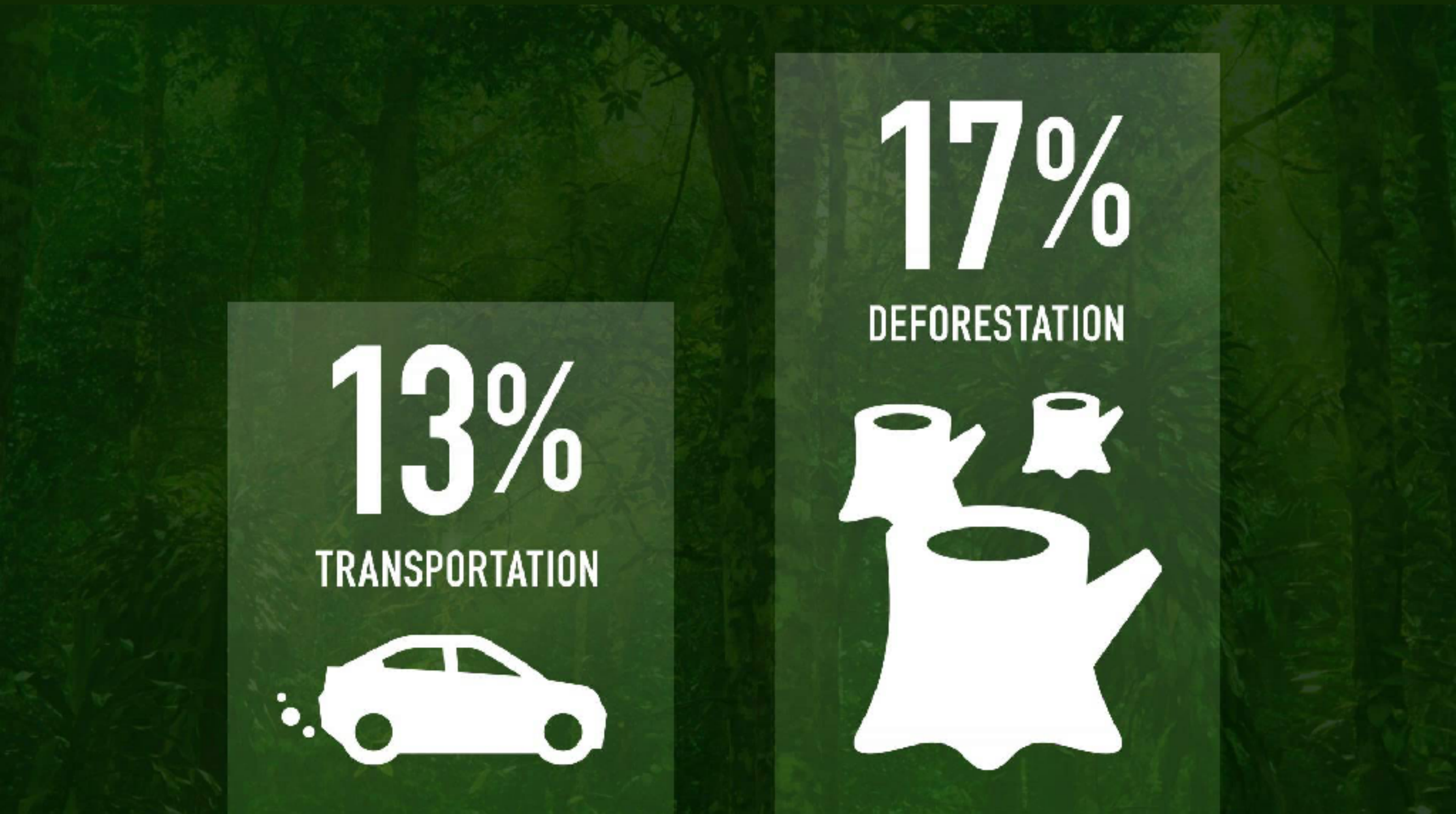
1 Soccer Field Every Second

The size of forest cover being lost or 5.2 million hectares every year

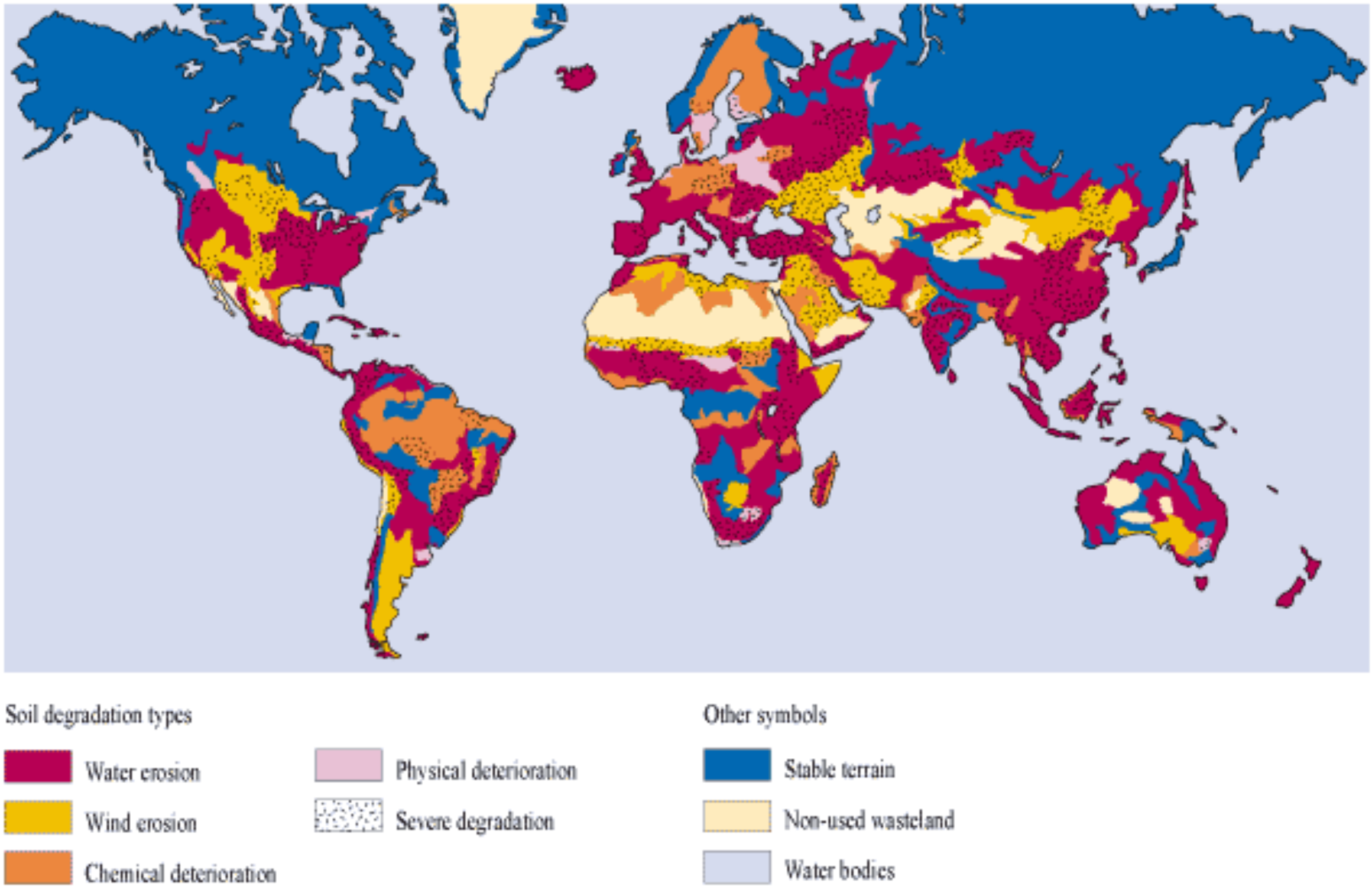
DESFORESTACION



DESFORESTACION



DEGRADACION DE SUELOS



CONTAMINACION DEL AIRE

cca Centro de Ciencias Ambientales

CONTAMINACION DEL AIRE

9 out of 10 people globally breathe poor quality air

WHO calls air pollution a public health emergency

THE WORLD OF WATER

Despite the fact that 70% of the Earth's surface is covered by water, only .0007% of it is accessible for direct human use.

CONTAMINACION DEL AGUA

2ND

LEADING CAUSE OF DEATH AMONG CHILDREN IS DIARRHEA

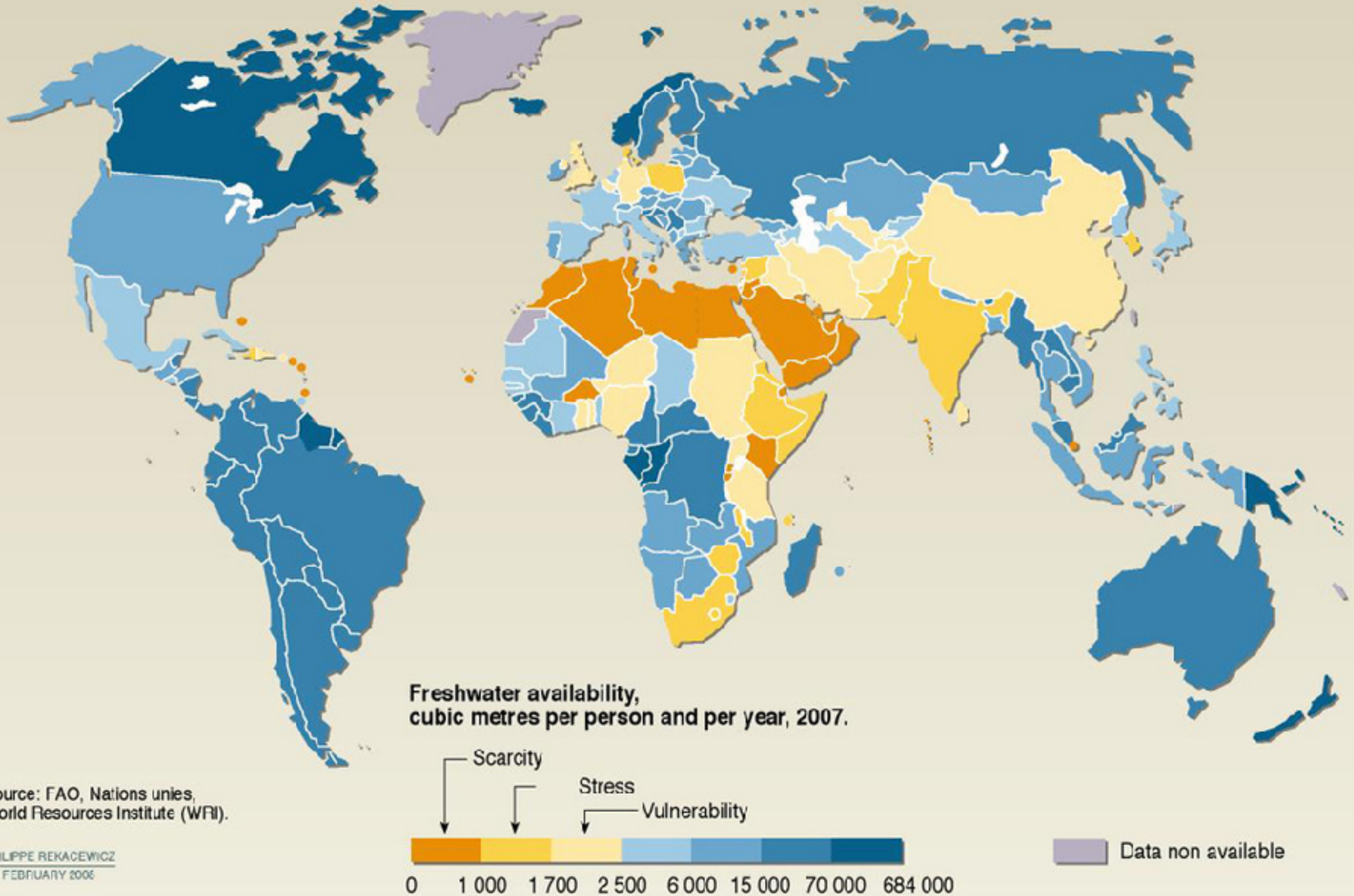
4,100

KIDS UNDER 5 DIE EVERY DAY FROM UNCLEAN DRINKING WATER

1 BILLION PEOPLE

HAVE NO ACCESS TO CLEAN DRINKING WATER

ESCASEZ DEL AGUA

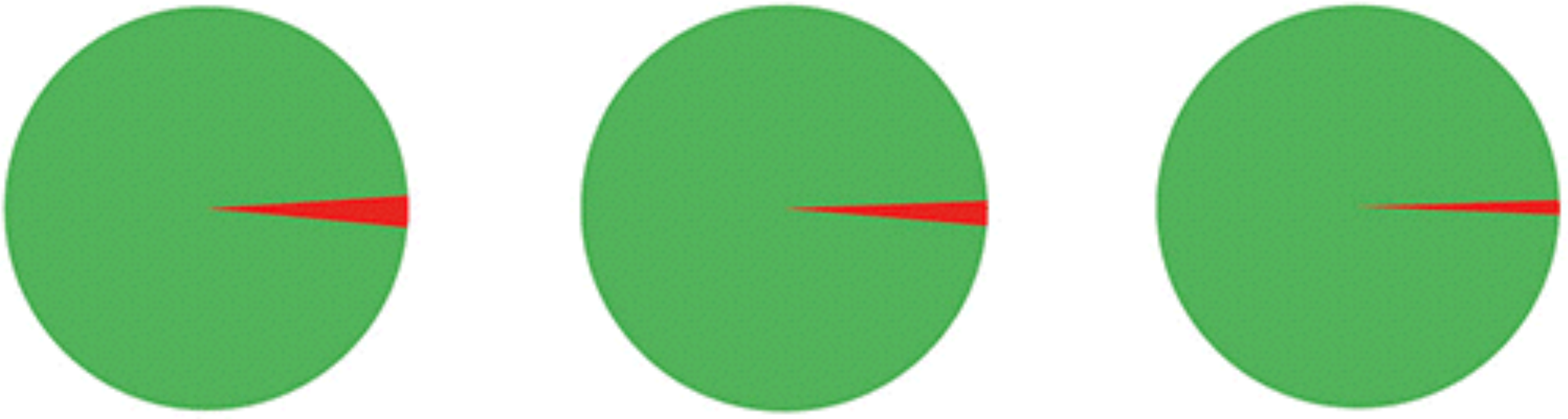


Source: FAO, Nations unies,
World Resources Institute (WRI).

PHILIPPE REKACEWICZ
FEBRUARY 2006

CAMBIO CLIMATICO

The Scientific Consensus on Climate Change



97%

Doran and
Zimmerman 2009
79 scientists

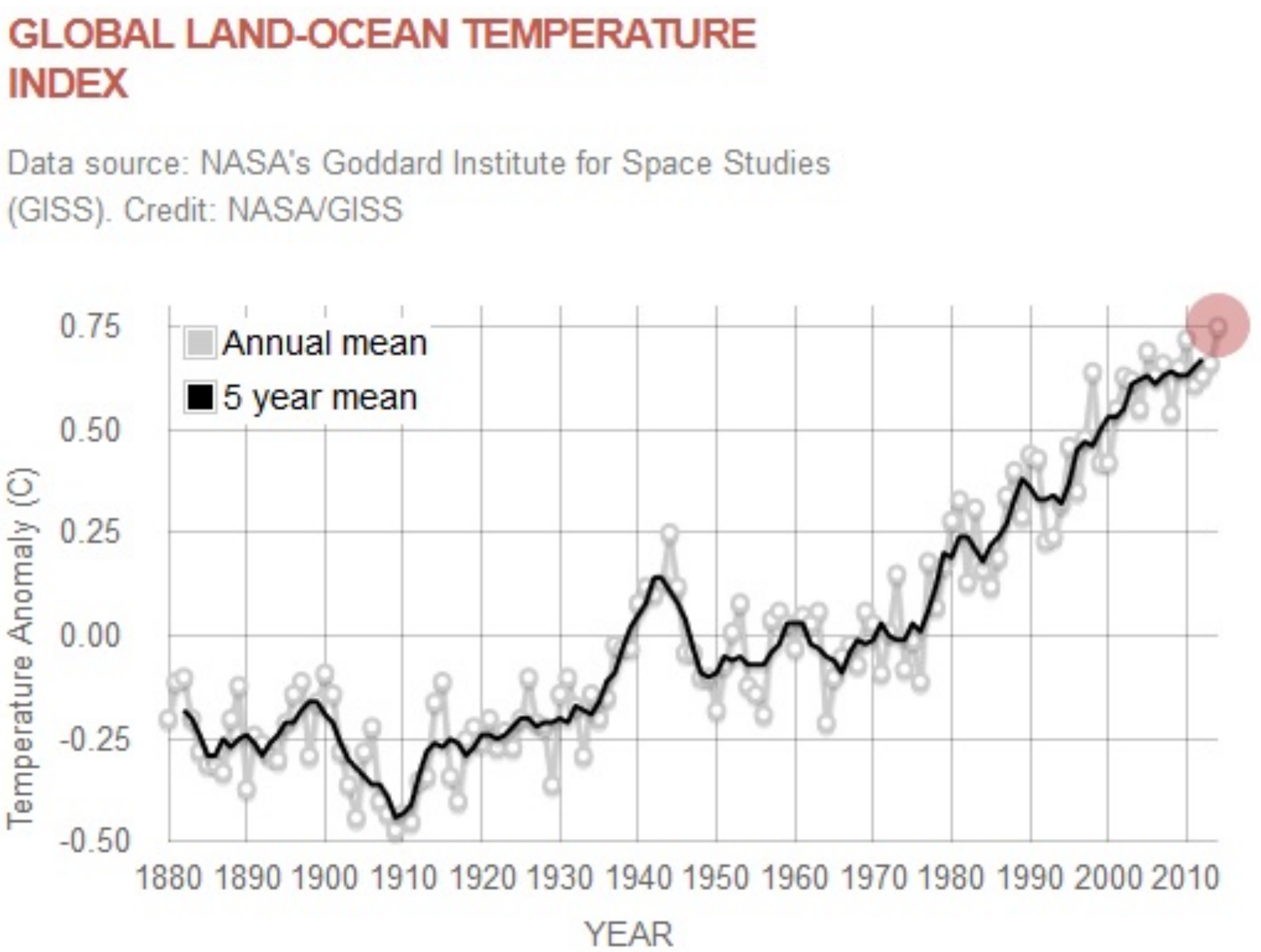
97.5%

Anderegg et al 2010
908 scientists

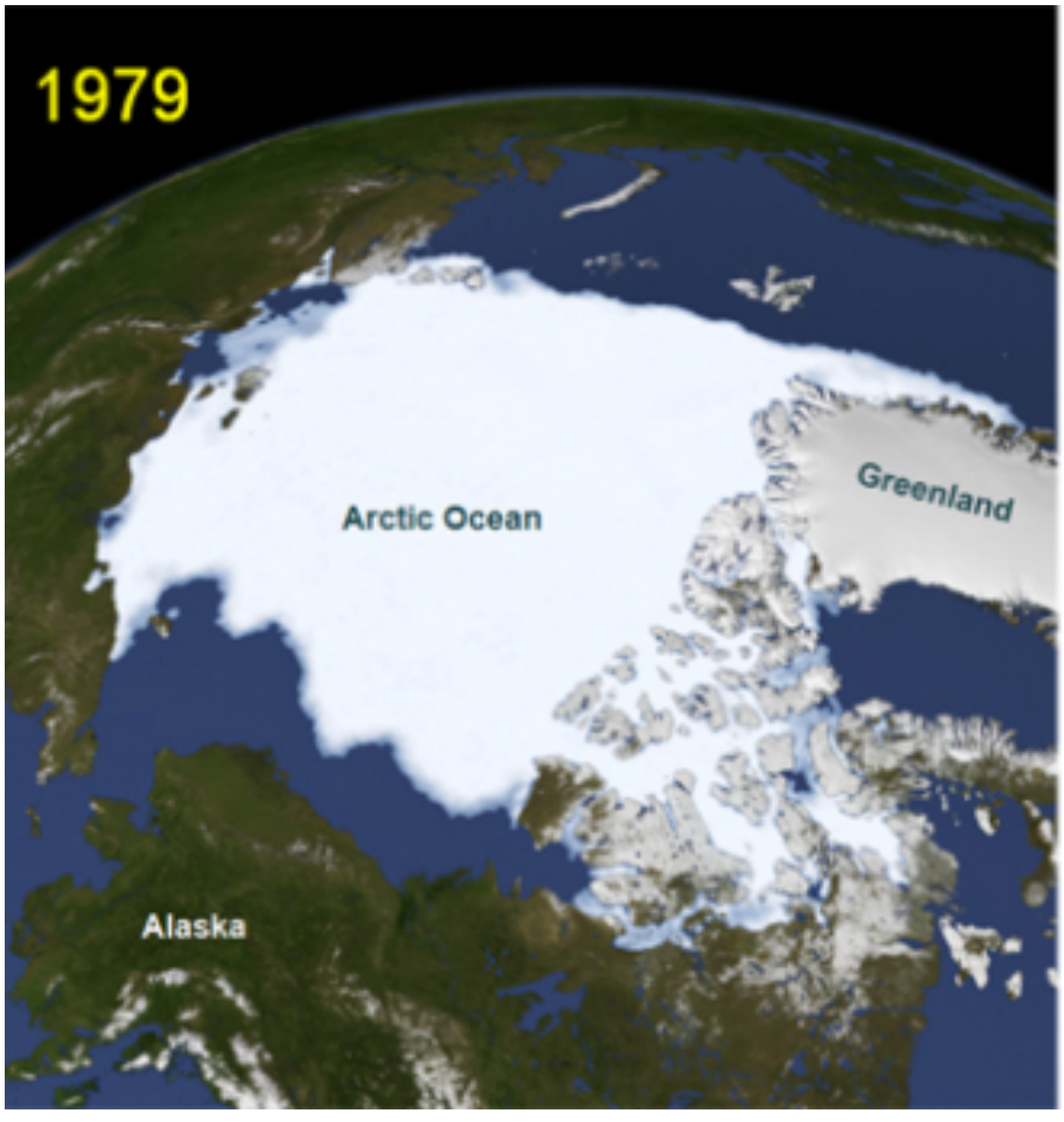
98.4%

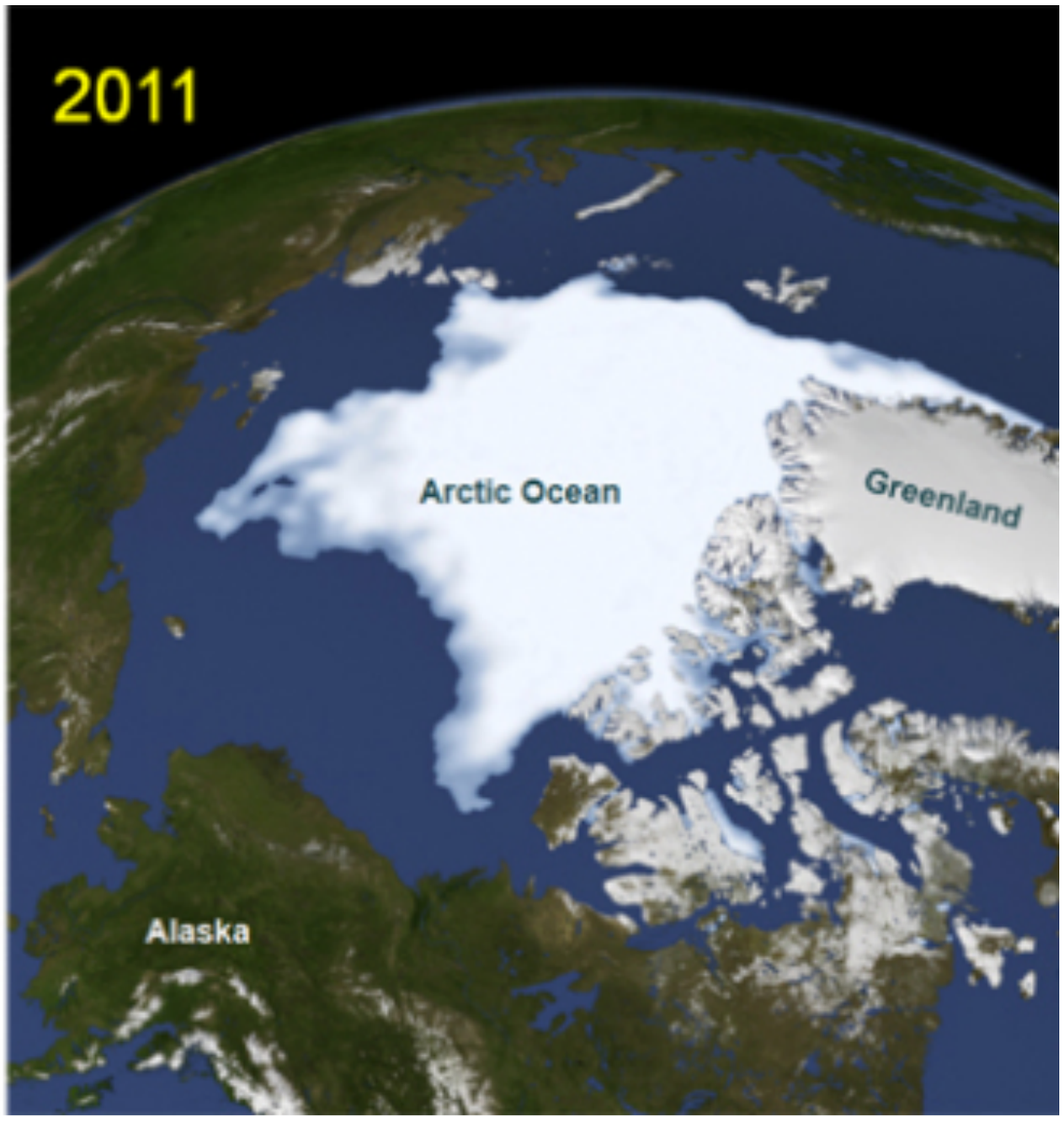
Cook et al 2013
10,306 scientists

CAMBIO CLIMATICO



CAMBIO CLIMATICO





POPULATION AND THE PLANET

IMPROVEMENTS

- MEDICINE ✓
- SANITATION
- AGRICULTURE
- TECHNOLOGY

WAYS TO INCREASE POPULATION

- ACCIDENTS
- MURDER
- DISEASE
- FAMINE
- WAR
- ABORTION ✗ BAD

WAYS TO DECREASE POPULATION

- GOOD ✓
  - CONTRACEPTION ✓
  - SMALL FAMILIES
  - ABSTENTION

TRAGEDY OF THE COMMONS

They are all going to go. If I don't take them someone else will.

IMPACTS

- LOSS OF BIODIVERSITY
- CLIMATE IN CRISIS
- DEFORESTATION
- POLLUTION
  - AIR
  - SOIL
  - WATER

FACTS

FOR 2 MILLION YEARS
¼ MILLION PEOPLE

1800 – 1 BILLION PEOPLE

1930 – 2 BILLION (130 YEAR LATER)

1960 – 3 BILLION (30 YEARS LATER)

1975 – 4 BILLION
(15 YEARS LATER)

1987 – 5 BILLION
(12 YEARS LATER)

1999 – 6 BILLION
(12 YEARS LATER)

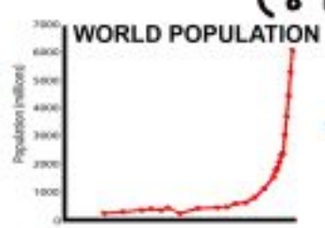
2007 – 6·5 BILLION
(8 YEARS LATER)

EXPONENTIAL GROWTH

1 PERSON PER SQUARE METRE — 780 YEARS LATER

PEOPLE MASS = EARTH MASS — 2400 YEARS LATER

1·8% GROWTH IN POPULATION EVERY YEAR



1·8% GROWTH IN POPULATION EVERY YEAR

EXAMPLE

- OPTION 1
- OPTION 2