

Effeti dell'agricoltura sull'ambiente

- Degrado dei suoli
- Salinizzazione
- Eccessiva estrazione di acqua
- Perdita di biodiversità
- Inquinamento da nitrati
- Inquinamento da fosfati
- Inquinamento da pesticidi

- Emissione di azoto
1998 emissioni totali = 15 milioni di tonnellate per anno, di cui:
 - Suoli naturali 40%
 - Oceani 20%
 - **suoli agricoli 14%**
 - fonti industriali 9%
 - **allevamenti 4%**
 - **combustione di biomasse 3%**

Inquinamento del suolo e delle acque: pesticidi, fertilizzanti, deiezioni animali.

Inquinamento dell'aria: combustione di biomasse (residui delle coltivazioni, deforestazione per ottenere pascoli e terra arabile), nel 1997 nel sud-est asiatico un solo incendio interessò 4,5 milioni di ettari, con una fitta nebbia che coprì a lungo vaste aree. Le savane tropicali e le foreste tropicali sono le aree maggiormente interessate dagli incendi. Gli inquinanti rilasciati nell'aria sono, ad esempio: anidride carbonica, ossido di azoto e particolato. Ammoniaca rilasciata dalle deiezioni animali, ha un potere acidificante superiore all'anidride solforosa, causa di piogge acide.

Perdita di biodiversità

Agricoltura e pesca sono forse tra le principali cause di perdita di biodiversità attraverso: le modifiche degli habitat naturali, l'uso di pesticidi e diserbanti che distruggono oltre alle specie bersaglio (patogeni e infestanti) anche altre specie di insetti, funghi, erbacee.

L'agricoltura e cambiamento climatico

L'agricoltura da un lato contribuisce alla produzione di gas serra, dall'altro ne aiuta la cattura.

Come fonte di gas serra l'agricoltura è soprattutto responsabile per la metà delle emissioni totali di metano.

Sebbene persista per un breve periodo nell'atmosfera, il metano è circa 20 volte più potente dell'anidride carbonica come determinante dell'effetto serra. Le attuali emissioni dovute a cause antropiche sono di 450 milioni di tonnellate per anno, con un tasso di crescita stimato per i prossimi anni di circa il 5% annuo.

Gli allevamenti da soli contribuiscono per il 25% delle emissioni totali di metano. A causa del cambiamento degli stili alimentari di paesi in rapido sviluppo si stima che da qui al 2030 si avrà un aumento di circa il 60% degli allevamenti, con un corrispondente aumento percentuale delle emissioni di metano.

Un'altra fonte di metano è data dalle coltivazioni in irriguo di riso, che cresceranno di circa il 10% entro il 2030.

**Al mondo oggi gli animali
d'allevamento sono
numericamente pari 3 volte la
popolazione umana.**

**Sono necessarie 10 kg di
proteine vegetali per produrre
un chilo di carne**

Oltre al metano l'agricoltura è anche una fonte di ossido di azoto, un altro importante gas serra. L'NO₂ deriva dai processi naturali di crescita delle piante, ma soprattutto dai processi di volatilizzazione dei fertilizzanti chimici. Anche per il NO₂ si stima una crescita del 50% entro il 2030.

L'agricoltura infine contribuisce alle emissioni di gas serra attraverso il consumo di combustibili fossili necessari nella produzione.

L'agricoltura sequestra carbonio: sia i suoli che la vegetazione catturano anidride carbonica. Nel 1997/99 si è stimato che circa da 600 a 1180 mil di carbonio siano stati catturati sottoforma di materia organica nei suoli a partire dai residui vegetali e degli allevamenti.

Carbon Sequestration through forestry relies on the natural process of photosynthesis, which uses carbon dioxide from the atmosphere together with sunlight in a chemical reaction to produce oxygen and glucose. The carbon dioxide from the atmosphere used in photosynthesis is effectively captured in the structure of the tree.

Carbon sequestration is the process through which agricultural and forestry practices remove carbon dioxide (CO₂) from the atmosphere. The term “sinks” is also used to describe agricultural and forestry lands that absorb CO₂, the most important global warming gas emitted by human activities. Agricultural and forestry practices can also release CO₂ and other greenhouse gases to the atmosphere.

Sequestration activities can help prevent global climate change by enhancing carbon storage in trees and soils, preserving existing tree and soil carbon, and by reducing emissions of CO₂, methane (CH₄) and nitrous oxide (N₂O).

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**I DUE PROCESSI FONDAMENTALI CHE IN NATURA INFLUISCONO SULLA
CONCENTRAZIONE DI OSSIGENO E ANIDRIDE CARBONICA NELL'ARIA:
FOTOSINTESI CLOROFILLIANA E CICLO DI KREBS.**

**Fotosintesi clorofilliana (trasformazione da sostanze inorganiche a
sostanze organiche: anidride carbonica +luce....=ossigeno....)**

La fotosintesi è il processo tramite il quale le piante producono il loro nutrimento. Assorbendo la anidride carbonica dall' atmosfera (ma anche dal suolo e dal sole) esse se ne nutrono e producono ossigeno che viene rilasciato nell' atmosfera (o nell' acqua nel caso di piante acquatiche). La fotosintesi è il processo oggi nettamente dominante sulla Terra per la produzione di composti organici da sostanze inorganiche. La fotosintesi si sviluppa in due fasi (dette luminosa e oscura) la prima delle quali è dominata dall'intervento del pigmento verde della clorofilla (da cui fotosintesi clorofilliana) in grado di catturare l'energia luminosa del Sole.

Ciclo di Krebs (trasformazione da sostanze organiche a sostanze inorganiche: zuccheri + ossigeno...= energia +acqua e anidride carbonica....)

Il ciclo di Krebs, o ciclo dell'acido citrico è l'insieme delle reazioni bio-chimiche che forniscono energia bruciando, vale a dire ossidando ad acqua ed anidride carbonica, i vari prodotti della demolizione delle molecole di zuccheri, grassi e aminoacidi.

È costituito da una serie ciclica di reazioni chimiche, alimentate soprattutto dalla scissione del glucosio, di importanza fondamentale in tutte le cellule che utilizzano ossigeno nel processo della respirazione cellulare (organismi aerobici). La maggioranza degli organismi viventi sono aerobici, cioè ricavano energia da reazioni metaboliche che richiedono ossigeno, per essi il ciclo di Krebs è il meccanismo biochimico essenziale alla produzione di energia.

Regenerative agriculture

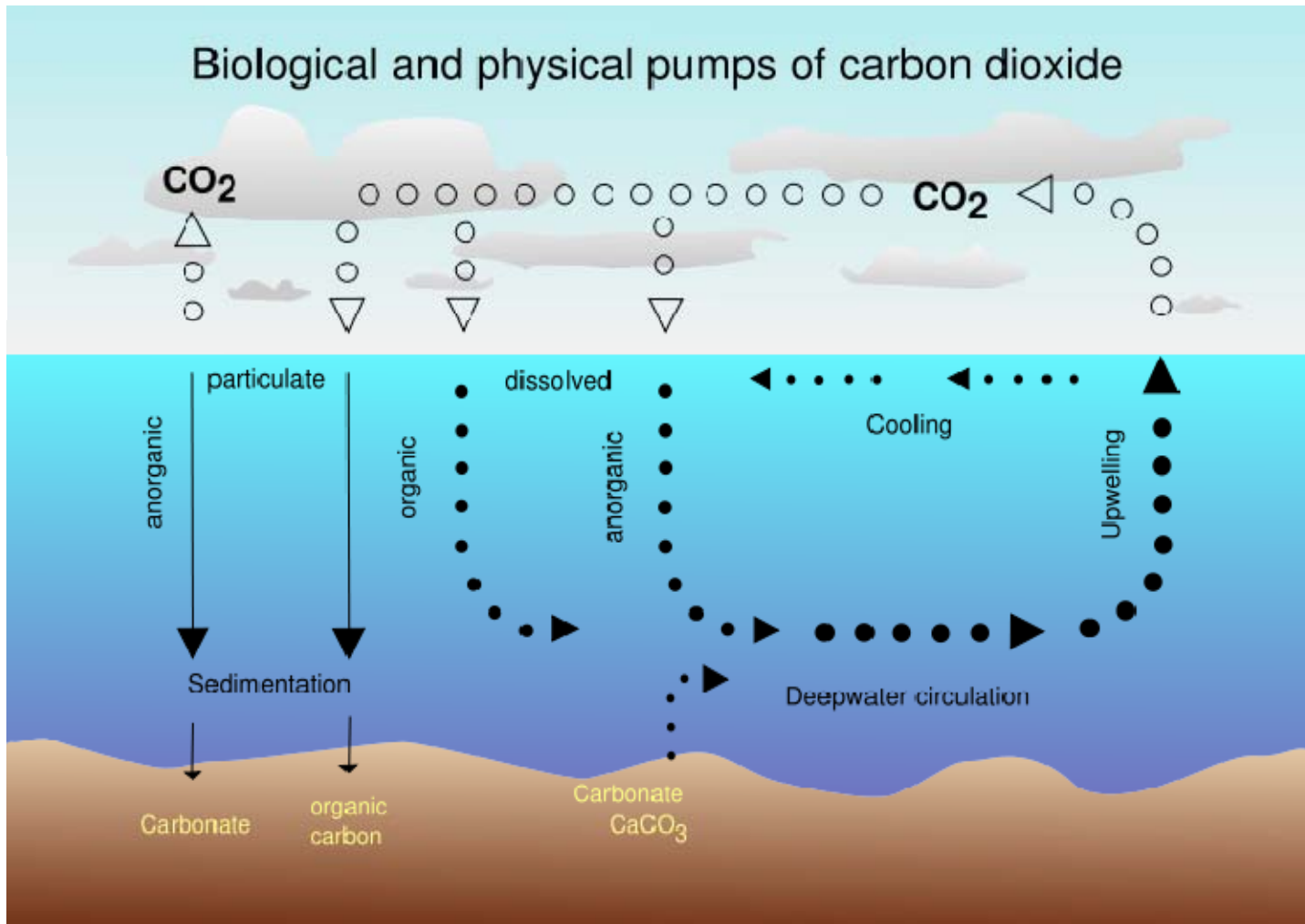
[Regenerative agriculture](#), if practiced on the planet's 3.5 billion tillable acres, could sequester up to 40% of current CO2 emissions.^{[8][9]} Agricultural carbon sequestration has the potential to substantially mitigate global warming impacts. When using biologically based [regenerative practices](#), this dramatic benefit can be accomplished with no decrease in yields or farmer profits. Organically managed soils can convert carbon dioxide from a greenhouse gas into a food-producing asset.

In 2006, U.S. carbon dioxide emissions from fossil fuel combustion were estimated at nearly 6.5 billion tons. If a 2,000 lb/ac/year sequestration rate was achieved on all 434,000,000 acres (1,760,000 km²) of cropland in the United States, nearly 1.6 billion tons of carbon dioxide would be sequestered per year, mitigating close to one quarter of the country's total fossil fuel emissions. This is the emission-cutting equivalent of taking one car off the road for every two acres under 21st Century regenerative agricultural management (based on a vehicle average of 15,000 miles per year at 23 mpg; U.S. EPA

Oceans

Oceans are natural CO₂ sinks, and represent the largest active carbon sink on Earth. This role as a sink for CO₂ is driven by two processes, the solubility pump and the biological pump.^[10] The former is primarily a function of differential CO₂ solubility in seawater and the thermohaline circulation, while the latter is the sum of a series of biological processes that transport carbon (in organic and inorganic forms) from the surface euphotic zone to the ocean's interior. A small fraction of the organic carbon transported by the biological pump to the seafloor is buried in anoxic conditions under sediments and ultimately forms fossil fuels such as oil and natural gas.

Biological and physical pumps of carbon dioxide



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Forests

Forests are carbon stores, and they are carbon dioxide sinks when they are increasing in density or area. In Canada's boreal forests as much as 80% of the total carbon is stored in the soils as dead organic matter.^[12] Tropical reforestation can mitigate global warming until all available land has been reforested with mature forests. However, the global cooling effect of carbon sequestration by forests is partially counterbalanced in that reforestation can decrease the reflection of sunlight (albedo). Mid-to-high latitude forests have a much lower albedo during snow seasons than flat ground, thus contributing to warming. Modeling that compares the effects of albedo differences between forests and grasslands suggests that expanding the land area of forests in temperate zones offers only a temporary cooling benefit.

Artificial sequestration

For carbon to be sequestered artificially (i.e. not using the natural processes of the carbon cycle) it must first be captured, *or* it must be significantly delayed or prevented from being re-released into the atmosphere (by combustion, decay, etc.) from an existing carbon-rich material, by being incorporated into an enduring usage (such as in construction). Thereafter it can be passively stored *or* remain productively utilized over time in a variety of ways.

For example, upon harvesting, wood (as a carbon-rich material) can be immediately burned or otherwise serve as a fuel, returning its carbon to the atmosphere, *or* it can be incorporated into construction or a range of other durable products, thus sequestering its carbon over years or even centuries. One ton of dry wood is equivalent to 1.8 tons of Carbon dioxide.

Nei prossimi trenta anni il cambiamento climatico potrebbe ridurre la capacità produttiva totale agricola (con effetti difformi per aree geografiche) ed aumentare la dipendenza alimentare dei paesi poveri (che sono per lo più come l'Africa situati nelle aree che verranno maggiormente colpite da siccità, desertificazione e inondazioni delle aree costiere a causa dell'aumento del livello dei mari).

Entro il 2100 è atteso un aumento della temperatura stimato tra il 2 e il 5,8%. Il livello medio dei mari aumenterà probabilmente di 20cm entro il 2030 e di 50cm entro il 2100. nella sola India entro il 2030 andranno persi circa 2000 km² di terra.

Tali effetti negativi potranno essere attenuati da politiche quali: agricoltura biologica, riforestazione, miglioramento delle pratiche agricole con nuove varietà di riso che emettano meno metano, migliore gestione dei residui delle coltivazioni e così via.

**LA PRODUZIONE E IL CONSUMO DI CIBO
PRODUCONO INQUINAMENTO ANCHE NELLE FASI
DELLA FILIERA AGROALIMENTARE SUCCESSIVE A
QUELLA AGRICOLA**

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Food packaging

Boxes, bottles, packets, cartons and cans.

The global food packaging industry is now worth \$100bn-a-year, growing 10-15% each year. Anything between 10% and 50% of the price of food today can be down to its packaging. As the amount of rubbish we produce increases, financial and environmental costs to our world also increase.

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How much waste?

According to [WasteOnline](#), UK households produce the equivalent weight of around 245 jumbo jets per week in packaging waste. In fact, 3.2m tonnes of the 26m tonnes of household waste produced annually comes from packaging. Meanwhile, 150m tonnes of packaging waste come from industry and commerce each year. Here's some number-crunching for you: 11% of household waste in the UK is plastic, 40% of which comes from the 15m plastic bottles we use every day. Only less than 3% of these plastic bottles gets recycled. Also, how much do you value the humble carrier bag? Fewer than 1% of the billions of plastic bags we use each year are recycled, and the majority are used only once. To achieve a change towards more sustainable packaging, it's not just the packaging that requires alterations but also our lifestyles and habits of consumption. European law wants us to recover 50% of all our packaging and to recycle 25%, but Britain, predictably, is seriously lagging behind.

Household Food Waste

An estimated 6.7 million tonnes of household food waste is produced each year in the UK, most of which could have been eaten. This wastes good food, costs us all money and adversely impacts on the environment. The amount of food we throw away is a major contributor to the production of greenhouse gases in the UK. The environmental costs of food waste are enormous. It is estimated that 20% of the UK's greenhouse gas emissions are associated with food production, distribution and storage. If we stopped wasting food that could have been eaten we could prevent at least 15 million tonnes of carbon dioxide equivalent emissions each year. The majority of these emissions are associated with embedded energy but a significant proportion arises as a result of food waste going to landfill sites. Once in landfill food breakdown produces methane - a greenhouse gas 23 times more powerful than carbon dioxide.

Mineral water in bottles: Environmental damages

The water bottling industry claims to be environmentally friendly. When looking at its disrespectful dealing with the precious resource (which keeps getting scarce: more than 40% of the world's population does not have even the most basic sanitation; more than one billion people still have no access to clean water sources [[unicef.Org](https://www.unicef.org)]), it's hard to believe that.

Furthermore nearly 90 percent of all plastic bottles are not being recycled (and won't become environmentally friendlier, if charged a refund for them [[SeattlePI.NWSource.Com](https://www.seattlepi.com)]). The environmental damages caused by waste made of plastic is tremendous.

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The 700-page *Stern Review on the Economics of Climate Change* by Sir Nicholas Stern (formerly Chief Economist of the World Bank) warns that climate change could shrink the global economy by 20%.

But Stern also planted seeds of hope by estimating that it could cost just 1% of global gross domestic product to reduce greenhouse gas emissions to a tolerable level, and invest in new low-carbon products and services. The impact of the food system on human-induced climate change is generally calculated to be around 25 to 30% of the total effect. Yet, identifying food choices as one of the main solutions for climate change gets only a tiny mention in the economist's lengthy report.

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Life Cycle Analysis is the favored scientific method for tracing greenhouse gas emissions of food products from farm to fork (or perhaps more accurately from farm to fart, since waste food is a major source of the powerful greenhouse gas methane). Through such analysis, sources of greenhouse gas in the food system are becoming better known, although the assessment is complex, and consumer advice to guide choices is never straightforward.

Nitrogen fertilisers

Currently, consumers have only simple rules-of-thumb to cut back on their contribution to the seemingly distant ramifications of their everyday food choices. Nitrogen fertilisers are used globally to increase yield from farming. Yet, they do so at significant climate change cost, due to energy used in production, and greenhouse gas emissions of nitrous oxides in use.

You will rarely see nitrogen fertiliser use appearing on the labels of food products. Organic farming excludes their use. In place, organic farmers use clover grown on additional land to produce fertility for the soil.

Such complexities must be considered in policy circles, if we are not to see a rush for productive land to produce biofuels without paying due consideration to the food and fertiliser services that the same land may also be needed for.

Transport

Choosing between different modes of transport can make a significant difference to the climate impact of our food choices. For example, we have seen estimates that food transported by air can have between 50 and 177 times greater greenhouse gas emissions than the same weight of produce transported by ship across long distances.

But once again, food miles and methods of transport rarely feature on the label, nor in economic analyses such as the *Stern Review*. The only time we have seen food transport methods openly declared in the mainstream food market is on the rare occasion when retailers such as M&S and Morrisons show off about the freshness of their fruit or fish by boasting that these are air-freighted.

Should we really be demanding fresh produce from all corners of the globe, which requires immediate transportation to ensure freshness, rather than supporting local markets first, with international markets considered only for less perishable produce? Stern does not say.

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Meat

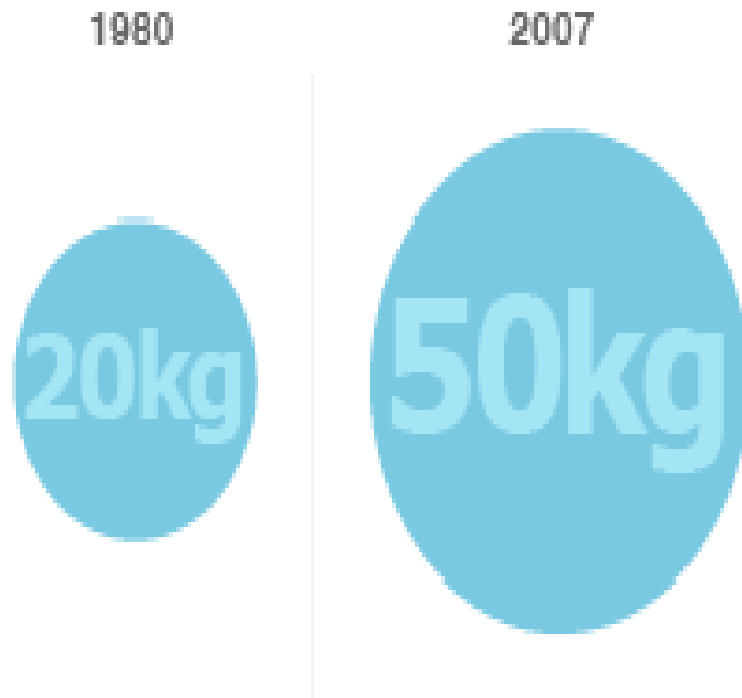
A further rule of thumb that Stern might have pointed out is that the increasing consumption of meat is creating an ever-greater burden on the environment. Put shortly, meat production and storage are responsible for high levels of energy use, due to fertilisation and transport of feed crops; destruction of carbon-sinking forests to make way for growing feed crops; energy-intensive production systems, and refrigeration in both transport and storage.

Lower consumption of meat could mean that mixed farms and upland areas would still benefit from being able to provide small amounts of extensively reared local meat. But on meat, Stern has little to say.

The *Stern Review* has been widely heralded as the 'tipping point' for the UK government's response to climate change. It should surely also be the tipping point for our relationship with the food system, for the benefit of our health, local food economies and the environment.

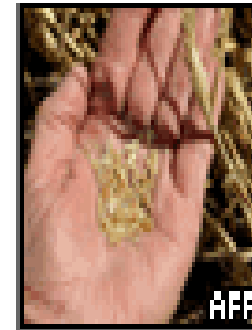
CHANGING EATING HABITS

Meat consumption in China per capita:

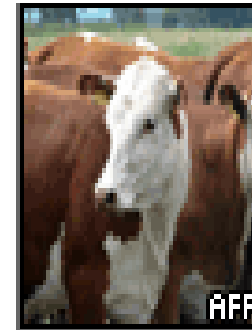


PRESSURE ON RESOURCES

1,000-2,000 litres of water is needed to produce 1kg of wheat

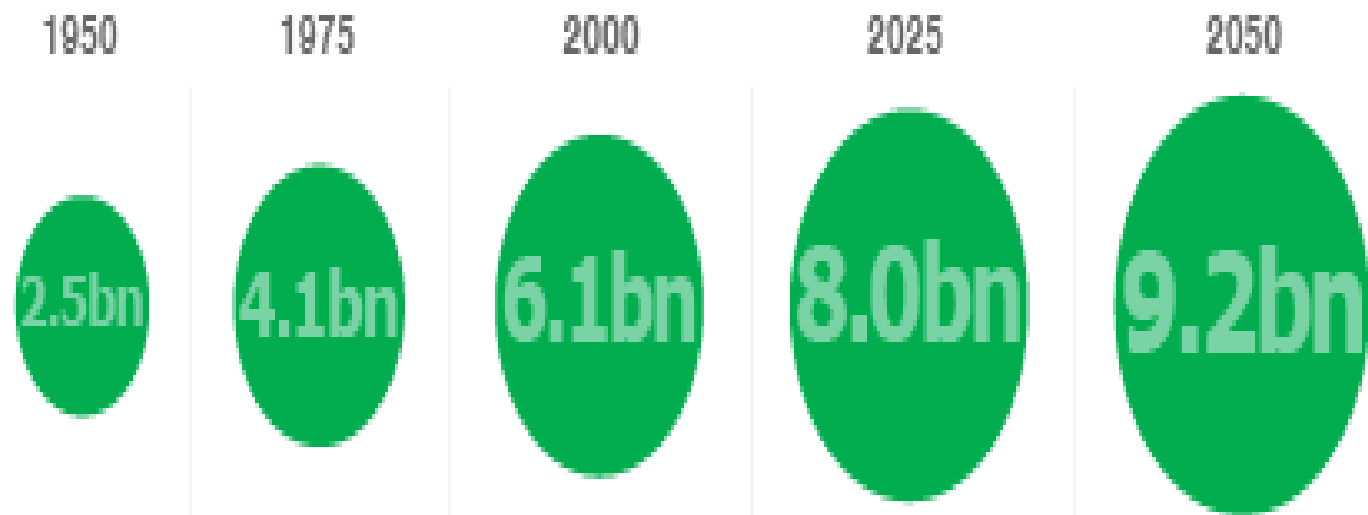


10,000-13,000 litres of water is needed to produce 1kg of beef



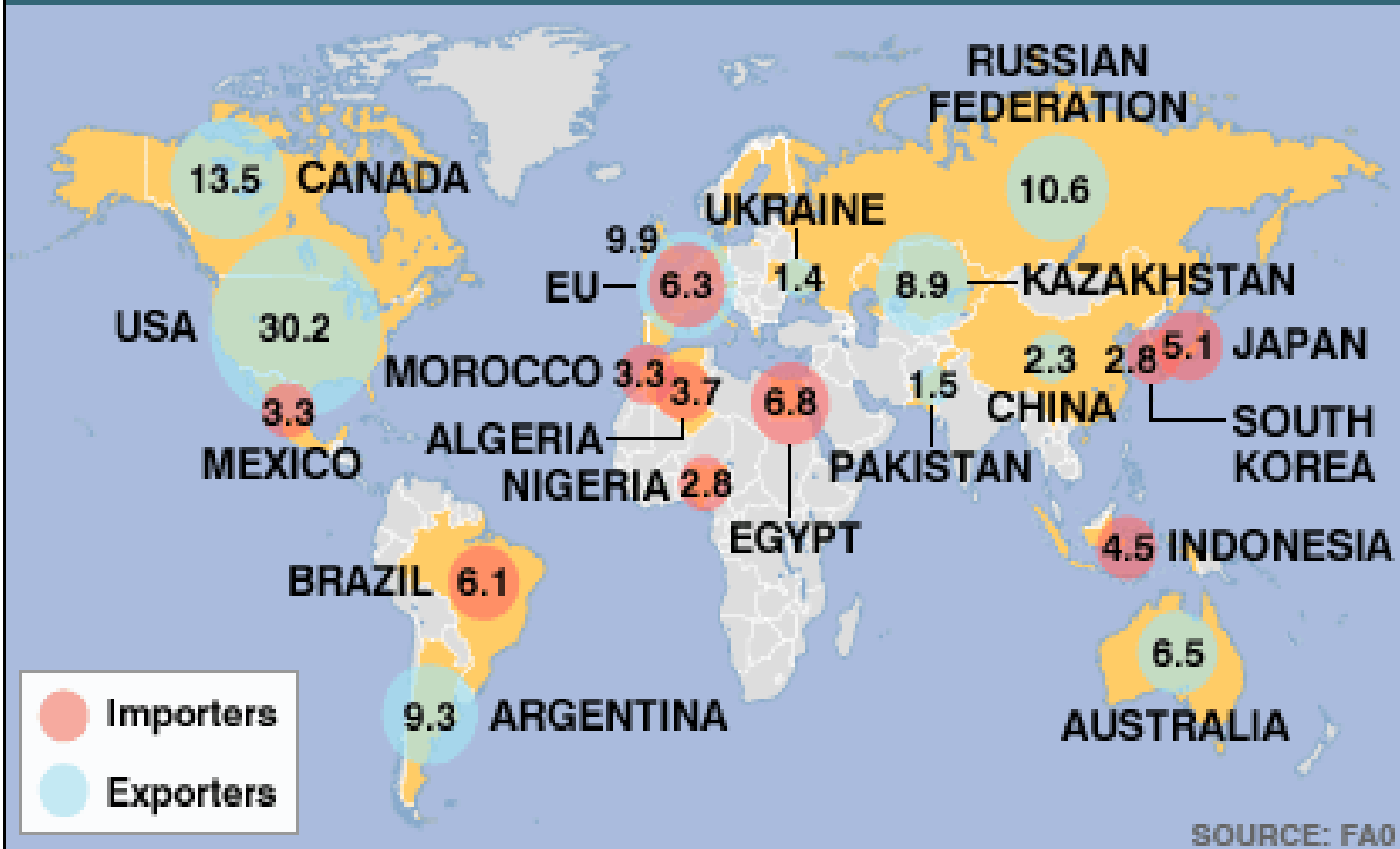
SOURCE: FAO

WORLD POPULATION GROWTH



SOURCE: UN

TOP 10 WHEAT IMPORTERS AND EXPORTERS, 2007 (%)



Composizione dell'atmosfera terrestre

La Terra possiede un'atmosfera caratterizzata da una struttura piuttosto complessa e suddivisa in più strati, che in ordine di altezza sono: *troposfera*, *stratosfera*, *mesosfera*, *ionosfera*, *esosfera*; la sua composizione chimica media al suolo è la seguente:

Azoto (N₂): 78,08%

Ossigeno (O₂): 20,95%

Argon (Ar): 0,93%

Vapore acqueo (H₂O): 0,33% in media (variabile da circa 0% a 5-6%)

Biossido di carbonio (CO₂): 0,032% (320 ppm)

Neon (Ne): 0,00181% (18 ppm)

Elio (He): 0,0005% (5 ppm)

Metano (CH₄): 0,0002% (2 ppm)

Idrogeno (H₂): 0,00005% (0,5 ppm)

Kripton (Kr): 0,000011% (0,11 ppm)

Xeno (Xe): 0,000008% (0,08 ppm)

Ozono (O₃): 0,000004% (0,04 ppm)

Sono anche presenti, in tracce, Ossidi di azoto (NO, NO₂; N₂O), Monossido di carbonio (CO), Ammoniaca (NH₃), Biossido di zolfo (SO₂), Solfuro di idrogeno (H₂S).