

A2 LEVEL

Environmental Technology

**Sustainability and Future
Development**
World population

For first teaching from September 2014

For first award in Summer 2015



environmental
technology

FACT FILE

environmental technology

Sustainability and Future Development, World Population



Specification Content

Students should be able to:

- Understand how the increasing population affects demand for the Earth's resources (fuel, water, food and shelter)



Course Content

World population

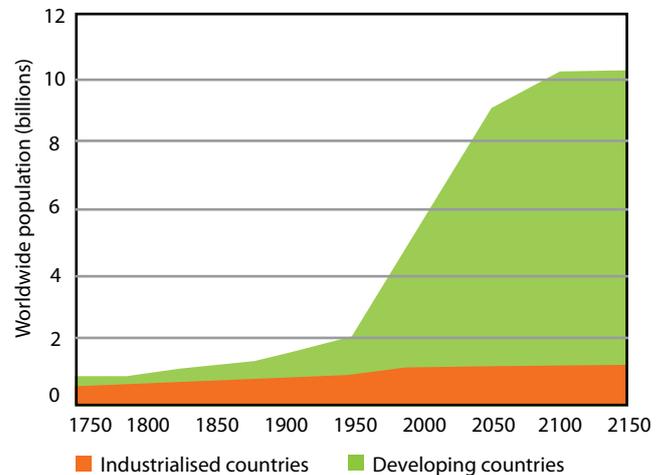
The world's population now stands at over 7 billion. This is predicted to grow by another billion people within the next 15 years. The latest data suggests that the global population is likely to reach nearly 9 billion people by 2040 and to exceed 10 billion in 2100.



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Population growth rates remain high in many low-income countries. Among them some of the world's most fragile states, many of which also have poor levels of natural resources, such as coal and oil.

The latest United Nations population projections forecast that the number of people living in what are now the least developed countries will rise from 832 million in 2010 to 1.26 billion in 2030, an increase of 51 per cent in just two decades.



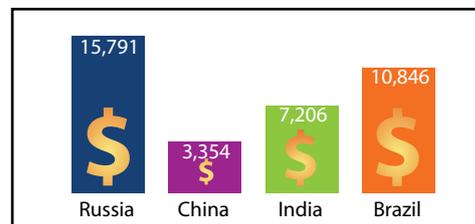
Emerging economies

In emerging economies like China and India, Gross Domestic product (GDP) per capita is expected to almost double in the next twenty years. GDP is the value of all the finished goods and services produced within a country's borders in a specific time period. It tells us about the wealth of a country.

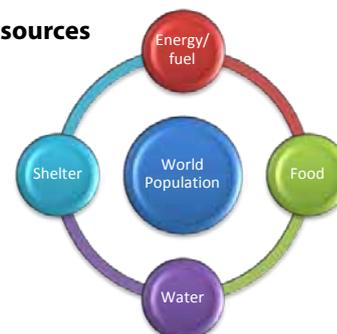
With a growth in GDP comes an increase in living standards. Population growth and increased living standards result in a strong growth of resource consumption or usage, which puts greater pressure on the planet.

The diagram below shows the GDP per capita for several countries.

GDP per capita



Facts on resources



Food

Global food demand has risen massively in the last decade. Although food production has increased due to advancements in technology, irrigation techniques, fertiliser use and expansion into new lands, the United Nations predicts that by 2050 there will be a global food shortage. In fact, food production could be 25 percent less than demand.



Factors influencing demand for food:

- Global massive population growth.
- Rising consumption of food per head of population in industrialised countries.
- Emerging economies with rising incomes and growing lifestyle expectations and consumption.
- Climate change and the impact on agriculture. For example, droughts and floods.
- Land degradation.
- Crop and cropland losses to non-food production such as growing food for energy.
- Water scarcity as agriculture and food production accounts for 70 percent of human use of the earth's fresh water resource.
- Desertification, resulting in less available land for agriculture.
- Urban expansion as populations increase and cities sprawl out into the countryside.

Subsequently, world food prices, which recently reached crisis level, are expected to increase by a further 30 to 50 percent by 2050.



Food production in developing countries

A country's ability to feed itself very much depends on three factors:

1. Availability of arable land
2. Accessible water
3. Population pressures

The more people there are, especially in poor countries with limited amounts of land and water, the fewer resources there are to meet basic needs. If basic needs cannot be met, development stalls and economies begin to collapse.

In some poor countries, attempts to increase food production and consumption are weakened by:

- Rapid population growth
- Migration from rural to urban areas
- Unequal land distribution
- Shrinking landholdings
- Deepening rural poverty
- Widespread land degradation

Food versus Energy debate

From a global resource point of view there are often trade-off's to be made with regards to energy and food. Many would argue that arable land should be used to grow food that can contribute to human consumption not to grow crops such as miscanthus and rapeseed for direct energy use.



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Water

Water is increasingly scarce. If current trends continue, 90 percent of freshwater supplies will disappear by 2030. Already, 700 million people face water scarcity.

With the majority of the world's people living in coastal areas, oceans are crucial for humanity's future — whether through direct economic activities such as fishing or because of the environmental services provided by the sea. Overfishing has led to 85 per cent of all fish stocks now being classified as overexploited, depleted, recovering or fully exploited, a situation considerably worse than two decades ago.

Meanwhile, agricultural run-offs mean that levels of nitrogen and phosphorus in the oceans have trebled since preindustrial times, leading to massive increases in coastal “deadzones”.

The world’s oceans are also becoming more acidic because they absorb 26 per cent of the carbon dioxide emitted into the atmosphere, affecting both marine food chains and coral reef survival. If ocean acidification continues, disruptions of food chains and direct and indirect impacts on numerous species are considered likely with consequent risk to food security, affecting the marine-based diets of billions of people worldwide.

Factors influencing the demand for water

- Agriculture
- Production of energy
- Industrial uses
- Climate change
- Human consumption

Agriculture and water

Production of crops and livestock is water-intensive, and agriculture alone accounts for 70% of all water withdrawn by the combined agriculture, municipal and industrial (including energy) sectors. The booming demand for livestock products in particular is increasing the demand for water.



Future global agricultural water consumption are estimated to increase by 19% by 2050, but this could be much higher if crop yields and the efficiency of agricultural production do not improve dramatically. Much of the increase in irrigation will be in regions already suffering from scarcity of water.

Energy, electricity and water

All sources of energy and electricity require water in their production processes, for example the extraction of raw materials, cooling in thermal processes, in cleaning processes, cultivation of crops for biofuels, and powering turbines to generate hydroelectricity.

Already, over one billion people lack access to electricity and other clean sources of energy. Global energy consumption is expected to increase by about 50% between now and 2035 due to population growth and increasing economic activity.



Water is an important part of many industrial processes. Increasing demand for water for industrial uses will result from increasing economic activity. As regards human consumption, the main source of demand comes from urban communities requiring water for drinking, sanitation and drainage.

Water and Climate change

Water is the primary medium through which climate change influences the Earth’s ecosystem and thus the livelihood and well-being of societies.



Global climate change is expected to increase and future stresses on water resources from population growth and land use, and increase the frequency and severity of droughts and floods. It is expected that climate change will affect the availability of water resources through changes in rainfall distribution, soil moisture, glacier and ice/snow melt, and river and groundwater flows.

Water-related hazards account for 90% of all natural hazards and their frequency and intensity is generally rising, with serious consequences on economic development.

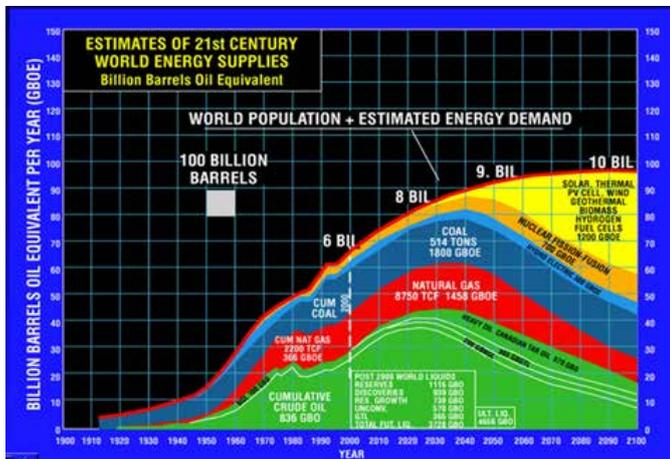
Energy



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While the demand for energy and electricity increase with a rising population, increasing industrialisation and emerging economies. Over 1.3 billion people globally, or 20 per cent of the world's population, lack access to reliable electricity, while 2.7 billion people still rely on traditional biomass (wood) use for their cooking needs.

The International Energy Agency estimates that ensuring universal access to modern energy services by 2030 could be achieved at relatively low cost and with a modest impact on the total energy demand and carbon dioxide emissions through investment in alternative energy technologies.



Recent years have seen renewable energy's share of power, heat and transport grow strongly, with renewables accounting for an estimated 16 per cent of global final energy consumption.

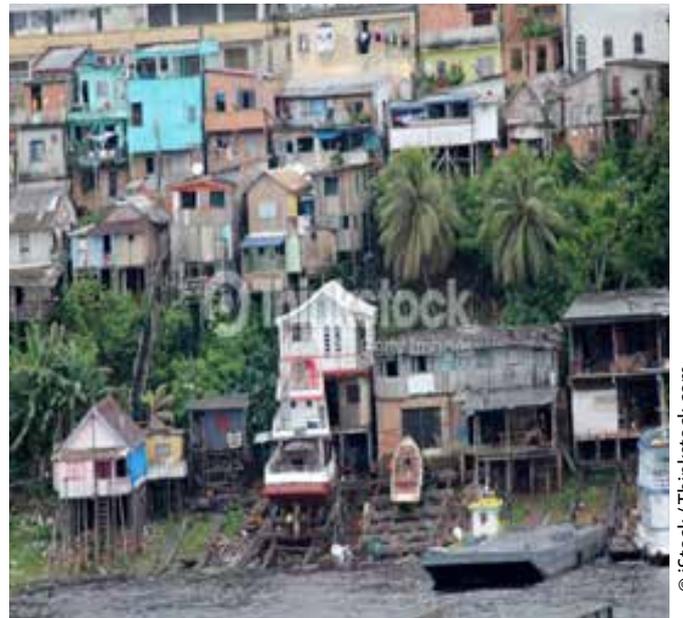
Progress has been especially rapid in some countries: in China, for instance, renewables account for about 26 per cent of total installed electric capacity, while in Brazil the share of renewable energy in power generation is over 80 per cent.



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Shelter

The world is experiencing a global housing crisis. Worldwide, some 827.6 million people live in urban slums. By 2020, it is estimated the world slum population will reach almost 1 billion. About 50 percent of the world's population now live in urban areas. Lack of clean water and sanitation claim the lives of more than 1.8 million young children every year.



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Activity 1

Watch the following TED Talk on population growth:

www.ted.com/talks/hans_rosling_on_global_population_growth.html



Activity 2

Check out your 'number' in the population at:

www.bbc.co.uk/news/world-15391515



Activity 3

To see real time world population statistics go to:

www.worldometers.info



Activity 4

Watch a documentary at www.topdocumentaryfilms.com/how-many-people-can-live-on-planet-earth/

In a Horizon special, naturalist Sir David Attenborough investigates whether the world is heading for a population crisis.

