

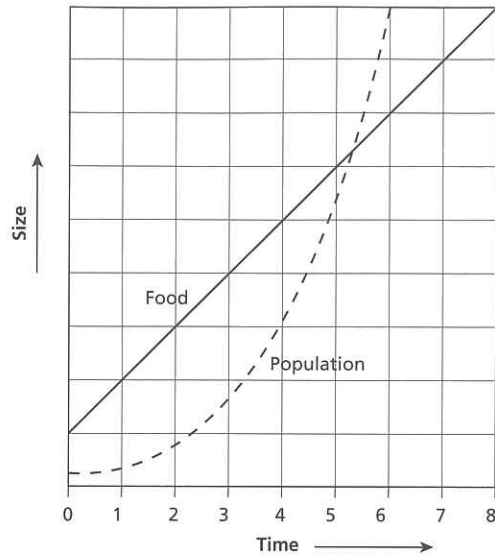
# Malthus, Boserup and the limits to growth

## MALTHUS

In 1798 the Reverend Thomas Malthus produced his *Essay on the Principle of Population*. He believed that there was a finite optimum population size in relation to food supply, and that any increase in population beyond this point would lead to a decline in the standard of living and to “war, famine and disease”. His theory was based on two principles:

- 1 In the absence of checks, population would grow at a geometric or exponential rate (1, 2, 4, 8, 16... etc.) and could double every 25 years.
- 2 Food supply at best only increases at an arithmetic rate (1, 2, 3, 4, 5... etc.).

Malthus suggested preventive and positive checks as two main ways by which population could be curbed once this ceiling had been reached. Preventive checks included abstinence from marriage, a delay in the time of marriage and abstinence from sex within marriage. Positive checks, such as lack of food, disease and war, directly affected mortality rates.



Relationship between population and food supply, after Malthus

## INCREASING THE CARRYING CAPACITY: BOSERUP

A different view to that of Malthus is that of Esther Boserup (1910–99). She believed that people have the resources of knowledge and technology to increase food production and that when a need arises someone will find a solution.

Boserup suggested that in a pre-industrial society, an increase in population stimulated a change in agricultural techniques so that more food could be produced. Population growth thus enabled agricultural development to occur.

Boserup assumed that people knew of the technologies required by more intensive systems and used them when the population grew. If knowledge were not available, then the agricultural system would regulate the population size in a given area.

### Increased food production

There have been many ways since Malthus's time in which people have increased food production. These include:

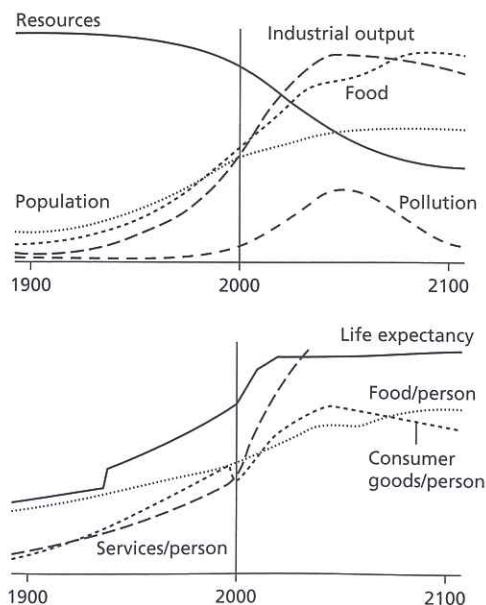
- draining marshlands
- extensification
- intensification
- reclaiming land from the sea
- cross-breeding of cattle
- high-yield varieties of plants
- terracing on steep slopes
- growing crops in greenhouses
- using more sophisticated irrigation techniques
- making new foods such as soy
- using artificial fertilizers and pesticides
- farming native species of crops and animals
- fish farming.

## THE LIMITS TO GROWTH MODEL

This study examined the five basic factors that determine and therefore ultimately limit growth on the planet: population; agricultural production; natural resources; industrial production; and pollution.

Many of these factors were observed to grow at an exponential rate. Food production and population grew exponentially until the rapidly diminishing resource base forces a slowdown in industrial growth. Because of natural delays in the system, both population and pollution continue to increase for some time after the peak of industrialization. Population growth is finally halted by a rise in the death rate due to decreased food, water and medical services.

The team concluded that if the trends continued, the limits to growth would be reached by about 2070.



Limits to growth